40 Rock

POPULAR Computing WEEKLY

35p 3-9 March 1983 Vol 2 No 9

This Week

Hobbit competition
Who will be first to complete *The Hobbit*? If you have stumbled through Elvan Halls, met Gollum and battled with bloodthirsty trolls, you should enter our new competition on page 31.

Spectrum software
Tony Bridge looks at a large selection of the latest Spectrum software. See page 12.

Inside Atari
David Kelly talks to Graham Daubney of Atari on page 11.

BBC and Education
Calvin Woodings explains the intricacies of Students 'T' significance test. See page 35.

★STAR GAME
Romeo and Juliet on 16K ZX81 by David Hanson. See page 8.

News Desk

Spectrum rival — the TX8000

THE TEXET TX8000 is a new computer offering similar capabilities to the Sinclair Spectrum machine.

With 8K Ram the 6502 machine runs Microsoft Basic and has eight colours and a *Beep* command. Although it has a moving key rubber keyboard, it will cost only £98.

It has 16 predefined graphics characters and a single-keyword entry facility. Display is: text, 32 x 16 characters; text/graphics, 64 x 32 pixels; and high-resolution, 128 x 64 pixels. A cassette interface, memory expansion bus, peripheral port and tv output are provided. A memory expansion pack, giving 64K, will cost £52.

The machine, manufactured in Hong Kong by Video Technology, will be distributed in the UK by Cheadle Hulme based Texet, beginning in April.

New micronet database

MICRONET 800, the Prestel-based telephone software service, has been officially launched.

As a special offer the first 10,000 subscribers will be able to connect up to the database for only £55. A quarterly subscription will also be charged.

Micronet will offer free games and educational programs, computer news and ac-

Continued on page 5

Spectrum power packs faulty

SINCLAIR is recalling some of its Spectrum power packs as they are faulty and could be dangerous.

Anyone who has bought a Spectrum since January 1, 1983, should check their power pack immediately. If the lead between the power pack and the Spectrum is black with a white stripe, the power pack should be returned to Sinclair (for further details see *Letters*, page 7).

Classified Classified Classified Classified

Computer Swap 01-930 3266
Free readers entries to buy or sell a computer. Ring 01-930 3266 and give us the details.

VIC20 with cassette unit, 3K high res + machine code monitor cartridges, + £70 games, books, joystick, £230 ono. 0273 608065.

48K SPECTRUM, over £100 worth software, + 175 other programmes, + 8 rolls printer paper worth over £300. Best offer over £225 secures. Tel: 01-656 1800 between 6—9 pm.

APPLE II EURO +, 48K, perfect condition + guarantee, £500. Tel: 051 733 1975, after 6 pm.

SHARP PC1211 plus printer and cassette interface, £65. Tel: 0908 679101 ext. 371. Mr Phillips.

HAVE TOSHIBA Personal Hi-fi with stereo FM tuner pack plus pocket camera with power drive. Will exchange for ZX Spectrum. Tel: Warrington (0925) 813033.

ATARI VIDEO GAME, 7 of the best cassettes including Basic program with key pads £130. Tel: 01-394 0456.

CBM 16K Ram pack for sale £45 ono. Micro Rabbit software to swap with any other. Tel: St Helens 52889 (6 pm).

SPECTRUM OWNERS
Why wait for weeks? HIGH SPEED hire service for all the software you could want. Just £10 life membership, plus £1.25 per tape (inc. P&P). Now you can TRY the best programs BEFORE you buy.
Join today. Send £10 for life membership and first free tape to:
SPECTRAL SOFTWARE LIBRARY
13 Charlecote Road, Poynton
Stockport, Cheshire SK12 1DJ
or send SAE for details

INTELLIVISION VIDEO, 5 cartridges, 3 months old, £150 or swap for Spectrum. Tel: Sheffield 886165.

JUPITER ACE, as new, all leads, manual, etc, cost £90, offers around £70. Tel: Waltham Cross 7736.

Continued on page 42

TEXAS TI 99/4A CASSETTE LEADS £4.95
INCLUDING POST AND PACKING
Single Recorder only
Orders to:
Clares, 222 Townfields Road, Winsford, Cheshire CW7 4AX
Tel: Winsford 51374

NATIONAL INDEPENDENT DRAGON USER GROUP
Due to the delay in the formation of the Dragon Data Club we have formed the Dragons Den.
Discounts, newsletter and much, much more. For membership details telephone 0582 570125 after 4.30 pm or weekends

VOLCANIC DUNGEON CHAMPIONSHIP

CARNELL SOFTWARE

WIN A FABULOUS wings HOLIDAY FOR 2 TO FLORIDA.

VISIT THE AMAZING NEW EPCOT CENTRE

Volcanic Dungeon, the addictive adventure. People have been known to venture into its maze of caverns to rescue the Princess Edora again and again. If you are one of them, or wish to be, then you could find yourself lying on a **sun-drenched beach in Miami for a week. Followed by a further week at Orlando**, visiting **Disney World** and **Epcot**. So what do you have to do for all this? **Just be the best Volcanic Dungeon player in the UK, that's all!** Ten finalists will battle it out in the championship at the London Computer Fair, Earl's Court in June 1983. **But first you must prove you are worthy.**

Volcanic Dungeon is available on the **16K ZX-81, 48K Spectrum and Dragon 32**. An entry form is supplied with every game. (Anyone who already owns the original ZX version can enter by sending a SAE for an entry form.) **Order your copy NOW from CARNELL SOFTWARE, 4 Staunton Road, Slough, Berks. Only £5.00** including P&P. **Also available from good microcomputer stores.**

The "Judges" decision is final and no correspondence will be entered into. All business associates of Carnell Software, and their relatives, are disqualified from entry. A copy of the rules of the Volcanic Dungeon championship will be supplied with the entry form.

POPULAR Computing WEEKLY

3-9 March 1983 Vol 2 No 9

SUNSHINE

The Team

Editor
Brendon Gore

News Editor
David Kelly [01-930 3271]

Software Editor
Graham Taylor

Sub-editor
Ninette Sharp

Editorial Assistant
Theresa Lacy

Advertisement Manager
David Lake [01-839 2846]

Advertisement Executive
Alastair Macintosh [01-930 3260]

Managing Editor
Duncan Scot

Publishing Director
Jenny Ireland

Popular Computing Weekly,
Hobhouse Court, 19 Whitcomb Street,
London WC2 7HF
Telephone: **01-839 6835**
Published by Sunshine Publications Ltd.
Typesetting, origination and printing by
Chesham Press, Chesham, Bucks
Distributed by S M Distribution
London SW9. 01-274 8611. Telex: 261643
© Sunshine Publications Ltd 1983

Subscriptions
You can have *Popular Computing Weekly* sent to your home:
UK Addresses
26 issues **£9.98**
52 issues **£19.96**
Overseas Addresses
26 issues **£18.70**
52 issues **£37.40**

How to submit articles
Articles which are submitted for publication should not be more than 3,000 words long. The articles, and any accompanying programs, should be original. It is breaking the law of copyright to copy programs out of other magazines and submit them here — so please do not be tempted.

All submissions should be typed and a double space should be left between each line. Please leave wide margins.

Programs should, whenever possible, be computer printed.

We cannot guarantee to return every submitted article or program, so please keep a copy. If you want to have your program returned you must include a stamped, addressed envelope.

Accuracy
Popular Computing Weekly cannot accept any responsibility for any errors in programs we publish, although we will always try our best to make sure programs work.

This Week

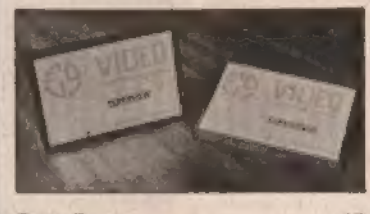
News 5
Micronet 800 launch.

Letters 7
Faulty Spectrum power packs.

Romeo and Juliet 8
A mathematical adventure game for 16K ZX81 by David Hanson.

Street Life 11
David Kelly talks ■ Graham Daubney of Atari.

Reviews 12
Tony Bridge looks at some of the latest Spectrum software.



Open Forum 17
Six pages of your programs.

Adventure 31
Hobbit competition and Tony Bridge's Adventure Corner.

BBC in education 35
Students 'T' significance test by Calvin Woodings.

Spectrum 39
Designer by David Lawrence.

Peek & poke 46
Your questions answered.

Competitions 47
Puzzle, Top 10, Ziggurat, Losers.

Editorial

The sixth ZX microfair, held at London's New Horticultural Hall last Saturday, was adjudged a great success by all concerned.

Sinclair sold all its Spectrum stocks on display and Kempston also ran out of supplies of its Spectrum joysticks. Queues for the entrance to the hall ran around the block, while inside people were standing four or five deep in front of some of the stalls. Software companies were besieged by customers eager to see the latest releases for the Spectrum.

Microfairs are a peculiarly British institution, and very much the brainchild of organiser Mike Johnston. The first ZX microfair was held at the Central Hall, Westminster, in November 1981 and attracted well over 5000 enthusiasts. The combination of software houses, hardware manufacturers and magazine publishers, has proved irresistible to many, though there have been a few complaints of overcrowding and lack of facilities.

A host of computer shows have been launched in the wake of the microfairs, from the giant Computer Fair in Earls Court to Argus's travelling road-show. But none of these later offerings has quite the charm or friendliness of the original.

Next Thursday

Can you defend your moisture farm from the hordes of thirst-crazed Womp Rats? Find out next week in Derek Spring's new game for the Spectrum.

Also next week, Keith Brain looks at Telewriter — a word processor for the Dragon 32.

Subscribe to Popular Computing Weekly

I would like to subscribe to *Popular Computing Weekly*.
Please start my subscription from the ..... issue.

UK Addresses: ☐ 26 issues at **£9.98** ☐ 52 issues at **£19.95**
Overseas Addresses: ☐ 26 issues at **£18.70** ☐ 52 issues at **£37.40**
Please tick relevant box
I enclose my cheque to *Popular Computing Weekly* for .....

Name .....

Address .....

.....

.....

Please send this form, and cheque, to *Popular Computing Weekly*, Subscription Dept., Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.

The Samurai* home computer is coming...

*Samurai is a trademark of Samurai Worldwide Ltd

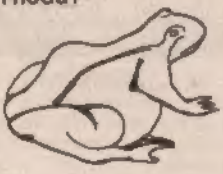
BBC SOFTWARE

BY

JSD

TWO ARCADE GAMES FOR THE BBC MICRO

FROGGY —



Exciting, full colour version of this popular game with logs, turtles, cars and bull-dozers.

Only **£6.90** inclusive P&P model B (or A+32K)

CRAZY RACE —

Steer your swaying balloon through the different mazes to gain the best bonus. Progressively harder levels with moving obstacles.

Only **£6.90** inclusive P&P model B (or A+32K).

ORIC SOFTWARE COMING SOON

Send cheque or PO to:

JSD SOFTWARE
28 WOODVALE GARDENS
WYLAM, NORTHUMBERLAND
DEALER ENQUIRIES INVITED

R & R

STAR TREK 48K

Rid the Galaxy of the evil Klingons. Protect your Star Bases from attack. *("Easy to play. Difficult to beat". Sinclair User Dec '82)*

ONLY £4.95

16K Spectrum GOLF

Hi Res Full colour graphics. A game for 1 or 2 players. All the features of a full size course. THE family game. *(Reviewed Sinclair User Oct '82)*

ONLY £3.75

P-E-P

THE PROGRAM ENHANCEMENT PACKAGE FOR THE ZX81 (16K)

A suite of easy to use machine code routines designed to transform your Basic programs.

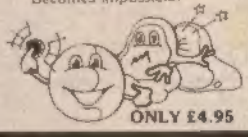
- DEFINED SCROLL REGION (1 line to whole screen)
- SCROLL up or down
- FILL SCREEN any character
- CHANGE BACKGROUND
- CHANGE FOREGROUND
- INVERSE VIDEO
- FLASH SCREEN
- CLEAR SCREEN without changing print position

Supplied on tape with a 6K DEMO PROGRAM and a FULL instruction booklet

ONLY £5.95

GNASHER 16K

THE ULTIMATE MAZE GAME. Ghosts, Energy Pills, Bonus Fruit, Sound, Colour + much more. Starts easy, Becomes Impossible.



ONLY £4.95

Send to: **R & R SOFTWARE (PCWK)** 48 HOUR DISPATCH
34, Baunton Road, Overseas +10% please
GLOUCESTER GL4 0LE Large Dealer Discounts
Tel: GLOS (0452) 502819

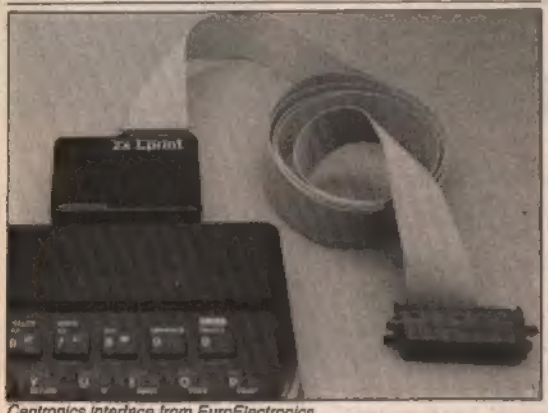
ZX SPECTRUM

Atari (US) axes 1700 in manufacturing move

ATARI (US) has axed 1,700 jobs at its California headquarters following the announcement of disastrous financial results for the last quarter of 1983 (see *Popular Computing Weekly*, February 24).

The redundancies result from the company's decision to move manufacture of its home computers away from the US. Production of the Home Computer and Consumer Products Divisions is now to be consolidated in Hong Kong and Taiwan. Output from Atari's smaller plants in El Paso, Texas, and Puerto Rico is also to be stepped up.

The 1,700 jobs lost represent nearly a quarter of Atari's employees at its Santa Clara base.



Centronics interface from EuroElectronics.

Spectrum serial parallel interfaces

BOTH RS232 and Centronics interfaces are now available for the ZX Spectrum.

Cobra Technology is offering an RS232 communications interface for £30. This includes both the hardware and the software needed to drive it. The interface allows the Spectrum to communicate with other computers either directly, or by telephone link using a modem.

The Menu-driven software will allow either half- or full-duplex and a data transfer rate variable between 75 and 1200 baud. An RS232 for the ZX81 is also available.

EuroElectronics has developed a Centronics interface for the Spectrum. The ZX Lprint unit — which will cost around £30 — enables almost any dot-matrix or daisy-wheel printer to be run from the computer. Any number of characters per line can be configured from the Spectrum using the interface.

For more information contact Cobra Technology, 378 Caledonian Road, Islington, London N1 and EuroElectronics, Zlin House, Oakfield Street, Cheltenham.

Micronet 800

Continued from page 1

cess to Prestel's existing pages. More advanced home and business software will be available at a cost 'far less than over-the-counter-prices'.

"A complete new world of information and entertainment has been developed for microcomputer users," said Micronet's managing director, Richard Hease. He hopes to attract over 100,000 subscribers within three years.

Sord and Aquarius get distribution

BOTH the Sord M5 and Matell Aquarius home computers will find their way into the high street shops following the conclusion of distribution agreements.

Computer Games Ltd is to handle the Sord machine. The computer should be available from the middle of March at a price now fixed at £189.95. Rom cartridges will cost £19.95. Computer Games Chairman Paul Balcombe said "Sord wished to concentrate its efforts on promoting its business computer range and we were on the look-out for a home computer to distribute. Hopefully we will sell the M5 machine through most major outlets — we already have dealings with Dixons, Smiths and Boots."

Micro Marketing has been appointed to distribute the Mattel Aquarius machine. The retail price has been fixed at £119.95 and the machine should make an appearance in the shops in June. Rom-based software has been priced at £21.95 and £25.95 for 4K and 8K cartridges, respectively, the thermal printer will be £129.95 and the data cassette recorder will be £59.95.

Michael Scott of Micromarketing said: "Mattel plan a promotional budget in excess of £1m and we believe the machine will have a big impact."

More of you than you thought

TWENTY percent of the British population are potential computer 'freaks' and wish they owned a computer.

This startling fact is just one finding of a new consumer poll, carried out by market researchers, Mintel.

Over one in thirty people already do own a micro and Mintel estimates that last year 470,000 under-£500 microcomputers were bought — more than three times the number for 1981. In money terms this represents sales of almost £100m.

Mintel's figures indicate that 40 percent of these sales, by value, went to Sinclair's ZX81 and Spectrum machines. Commodore took an 18 percent share with the Vic20 and Acorn's BBC came third with 9 percent.

The Dragon 32 came fifth — quite an achievement considering that the machine was only launched towards the end of the period from which the figures were drawn.

Those with home computers tend to spend between £30 and £120 per year on software — those with the more expensive machines spend nearer the upper end of this range.

The Market Intelligence Report on Home Computers is available from Mintel Publications, 7 Arundel Street, London WC2.

Young marketeer

SEVENTEEN-year-old Derek Bartle has been appointed to set up and operate a UK distribution network for Mikrogen.

In the last 18 months the company has expanded to produce both hardware and software for a variety of machines and has negotiated marketing deals with a number of established software houses, including Rabbit, Hilderbay and Saturn Developments.

Mikrogen is currently poised to launch the first independent software for the Oric – two 16K adventure games Return to Earth *and* Mines of Saturn, *both priced at £5.95 plus 40p postage and packing. The company has also recently begun to sell a joystick unit and controller for the Spectrum.*

VCS 2600 grows up

A KEYBOARD add-on for the Atari 2600 VCS games machine giving the system computing power was announced in America last month.

As well as providing a keyboard the unit will include an additional 8K Ram. It will go on sale in the US in the summer, priced around £60.

At present there are no plans for Atari (UK) to launch the product.

To all owners of Sinclair ZX Spectrum computers

URGENT

If you bought, or received as a replacement, a Sinclair ZX Spectrum computer since 1 January 1983, check your power supply (mains adaptor) *now.*

We believe that a batch of adaptors from one of our suppliers is faulty, and in certain circumstances might conceivably prove dangerous.

So... if, *and only if,* the lead between your power supply and your computer is black *and white* and you received it since January 1st:

1. Switch off at the mains, disconnect your system, and take off the plug.

2. Pack your power supply and post it to us at the address below *with your name and address enclosed.* Please do *not* return your computer, which is perfectly safe.

3. We will replace the power supply as soon as possible.

Please accept our apologies in advance for any inconvenience.

Send your power supply to:
Sinclair Research Ltd, Unit F, Broad Lane, Cottenham, Cambs., CB4 4SW.

sinclair

LETTERS

Airing on copyright

We have just read your magazine's article by Gail Counsell on copyright and computer software (*Popular Computing Weekly*, February 3-9). First let us say that we are very pleased to see that the topic is at last being aired in the press. It was a pity that Miss Counsell came out in favour, or so it seemed to us, of software libraries for we must voice our support of Bug-Byte and Silversoft in condemning these organisations. Lending software in itself is possibly commendable, but the almost inevitable copying of tapes can only damage the software industry, and in turn lead to higher prices (aren't they high enough already?) to compensate for lost revenue.

Our major concern though was over Gail Counsell's comments about compilers. The article showed that she has a complete ignorance of them — as witnessed by her statement that the object code they produce is 'very like machine-code'! It *is* machine-code, Miss Counsell. It was also very misleading of her to mention compilers and assemblers in the same breath as if they do a rather similar job. They do not. An assembler is very much like a tool in that it literally translates the programmer's input. However, the story is very different for Basic compilers.

There is naturally a great danger that your readers will take Miss Counsell's word as gospel, and for this reason we hope you will allow us to make the (admittedly confused) situation clearer. You can think of a compiler as two programs in one: the compiler itself and a series of 'run-time routines'. The compiler itself does the actual 'translation' and it uses the run-time routines to attain much of the resulting code (by calling these routines at appropriate times).

It could be argued that the translation is in a sense "intelligent' — at least in stark contrast to the literal decoding an assembler undertakes. But we would acknowledge that it would be a lengthy court case that would sort out whether this translation constitutes a part ownership of the copyright of the final translated program.

What is less in dispute is the copyright of the actual game — the logic of it, the ideas that went into devising it, and so on. These we think are best considered the property of the writer, not of the company which supplied the compiler which did the translation. Once again, though, a court will one day have to decide this in a test case.

What we feel is clearest in this whole affair though — and it is this point we wish to make most strongly to your readers — is that *every program compiled with a compiler will contain within it the run-time routines which are quite definitely the property of the person or company which holds the copyright of the compiler itself.* And no program can be compiled without these run-time routines being present in the final code. The final code would not run if they were removed in whole or part.

It is thus on this basis that we feel quite certain that a program compiled with a compiler, such as ours for the 48K ZX Spectrum, is not wholly the copyright of the writer who used the compiler. We also feel that it is more than fair and correct that the company producing the compiler should ask some nominal fee or royalty as we (amongst others) do.

Finally, to put the matter in some perspective, writing a program in Basic is notoriously quicker for the vast majority of programmers than writing a 'similar' program in machine code. But with a compiler, someone writing in Basic can produce a program almost indistinguishable from one in customised machine code (which has taken a good m/c programmer many weeks to devise) in an evening or two. Surely that advantage more than offsets any nominal royalty a compiler producer might ask?

Tim Langdell
Softek
329 Croxted Road
London SE24 9DB

In your enthusiasm to defend the charging of royalties on compiled programs, you failed to note the point of the article. Gail Counsell's argument was that the work of the compiler would not be regarded as original in each case. So, on the present interpretation of the copyright law, the author of the compiler would not be able to claim any copyright on a compiled program.

On your other point — about software lending libraries — if you read the article more carefully, you will see that Gail Counsell did not 'come out in favour' of them. She simply explained that it is a difficult area of law.

And then it won't record

In December I purchased a Dragon 32. I am experiencing problems in recording programs. As we all know, it takes hours copying a program and usually even more hours debugging it. At the end of this you can imagine how I feel when I find that I cannot record it.

I purchased a new Sanyo cassette recorder and was told by the dealer that it would work. I have fiddled with the volume control (it has no tone control), and I can assure you that it is a very hit and miss affair.

Through your excellent magazine may I ask your readers if they have experienced similar problems, or better still, can they help?

P A Low
52 Janes Lane
Burgess Hill
West Sussex RH15 0QR

Yet another Basic quirk

May I add my morsel to the growing pile of Spectrum Basic quirks. If you Run the following routine it will wait for about four seconds before printing '1' (the delay being provided by line 10), then a further four seconds later (line 30), it will print '2'. And, if you press a key after the '1' has been printed it will terminate the *Pause*, and '2' will be printed immediately. So far so good.

But now try Running it and pressing a key *before* the '1' has been printed, ie while it is executing line 10. You will find that the *Pause* statement in line 30 lasts for no time at all!

```
10 FOR A=1 TO 500 : NEXT A
20 PRINT 1
300 PAUSE 200
40 PRINT 2
```

It seems that a *Pause* command looks to see if a key is being or *has been* pressed. If this 'bug' is likely to be a problem you can get round it by adding a second (short) *Pause*; try changing line 30 above to:

```
30 PAUSE 1 : PAUSE 200
```

Mike Lord
Timedata Ltd
16 Hemmells High Road
Laindon
Basildon
Essex SS15 6ED

Spectrum power pack problems

We need urgently to contact a number of our customers who have purchased, or received as a replacement, a Sinclair ZX Spectrum computer, since January 1, 1983.

Anyone in this category should *immediately* check their power supply/mains adaptor. We believe that a batch from one of our suppliers is faulty and, in certain circumstances, might conceivably prove dangerous. The batch is limited in number and easily recognised.

If, and only if, the lead between the power supply and the Spectrum is black with a *white* stripe, then:

(1) Switch off at the mains, disconnect the system, and remove the plug from the power supply.

(2) Pack the power supply and post it to Sinclair Research Ltd, Unit F, Broad Lane, Cottenham, Cambs, CB4 4SW.

The computer itself is perfectly safe and should not be returned.

We will be replacing the power supply as soon as possible, and would like to apologise to any of our customers affected for the inconvenience caused.

Finally, could I reassure all our customers that the problem is restricted to a limited number of Spectrums and affects none of our other products.

Nigel Searle
Managing Director
Sinclair Research Ltd
25 Willis Road
Cambridge CB1 2AQ

Romeo and Juliet

A new game for the 16K ZX81 by David Hanson

Romeo and Juliet is a mathematical adventure game for the 16K ZX81. When run, the program displays a graphic representation of the balcony scene from the play. The user is then requested to answer some mathematical questions — the level of difficulty can be adjusted to cater for seven- to 16-year-olds, or older, if required.

If the user answers enough questions correctly, then the scene changes. First, Juliet moves to the edge of the balcony. Next, she speaks to Romeo. Romeo then walks into the garden from beneath a tree. Juliet throws a flower which Romeo catches and an owl flies across the sky to perch in the tree.

Each player is given a maximum of 40 questions. As soon as a player answers 35 questions correctly, Romeo climbs up the balcony and embraces Juliet. If a player fails to answer 35 questions correctly, Romeo is shot in the back by an arrow.

A record of the number of questions, and the number of correct answers, appears in the tower beneath the balcony.

THE COBRA QUANTUM JUMP!

ONLY **£26.85** INCLUSIVE VAT

Why pay more when you can use your Sinclair* to tie into a mainframe and/or networks with the COBRA RS 232 COMMUNICATION INTERFACE.

SOFTWARE AVAILABLE AT **£4.50**

COMPLETE KIT INCLUDING MANUAL **£30.00**

COBRA Technology Limited

*Suitable for use with Sinclair ZX81 or Spectrum (Specify when ordering)

COBRA Technology Ltd., 378 Caledonian Rd., Islington, London N1 1DR

Manufacturers of Quality Micro Technology Peripherals

Talking of Atari

***David Kelly** talks to Graham Daubney, Atari (UK)'s product manager*

Graham Daubney, Product Manager of Atari (UK).

When Atari's 400 and 800 machines were launched in the US, back in 1979, they were among the first home computers to be seen in the US.

In the four years since then, the Atari machines have become extraordinarily successful ■ America. But this success has not been repeated ■ Britain, largely due to their high price compared with other micros.

To try to shake things up a bit, Atari formed a UK company last April. It's first employee was Graham Daubney.

"One of the problems over the last year," he says "has been that in some ways the name of Atari is not associated with computers. Because of our success with the coin-operated games and the VCS games machine, people have tended to think that the Atari home computers are games machines. Perhaps our biggest problem has been to explain that with ■ that graphic power and speed — to produce the best games — you have to have an awful lot of computing power. Those people who have bought the Atari system have found that out — even we have been surprised at the number of disc drives we have been able to sell in Britain.

"There is a lot of marketing hype going on at the moment — Atari doesn't want to get involved in that. We are very happy with the start we have made in the UK.

"Rather than playing ■ numbers, we would prefer ■ play at quality and service," says Daubney. "It is nice to sell a lot of boxes but, equally, it is important to sell them in the right way — with 100 service centres up and down the country. It is good to know there are guys downstairs answering end-user enquiries."

It is ironic that many of Atari's problems of image have been caused by its success in the video games field. The Atari name is synonymous with the best in games software. Even now, 10 years after Atari produced the first arcade video game, *Pong*, the company has a strong leaning towards entertainment software.

Each of the company's three divisions — Coin Operated Games, VCS Games and Home Computers — has its own software development team. Over the years this has resulted in the development of many of the most successful arcade games: *Asteroids, Centipede* and, recently, *Tempest*.

Part of the reason Atari (UK) came into being was to provide a British software development facility. Atari is particularly keen to produce material for the British educational market.

"The main aim is to translate existing material, where appropriate," says Daubney. "Most of the entertainment software is directly applicable. The same things go down well both in the States and here.

"We are also signing contracts with third parties to produce software for the UK and Europe. If we decide we want a particular piece of software on the Atari, we provide the programmer with whatever hardware and software tools are necessary and a technical assistant who will see the project through to the end. In short, the programmer will be actively supported by us. Alternatively, if a software house develops something that is new, we may negotiate for a licence — but our standards are rather high.

"In fact, on the entertainment side, there is not a lot that we would want to contract out — we wouldn't want to buy back *Pac-Man*, version twelve.

"We are actively developing educational software. Even though Atari is not one of the recommended micros in schools, we are hoping for great things — if the Computer Studies room has a computer that is not ours, I will be quite happy with the rest of the school: the music room, the art room, the geography room!"

Atari in the US has just concluded licensing agreements with Disney and United Feature Syndicate to use the Disney and Peanuts cartoon characters. Atari machines are well-suited for cartoon animation. Instead of having to flip pages to get animation it is possible to change character sets. The cartoon figure is defined in different positions using the same alpha-numeric symbol in different character sets. This incidentally, is the technique Atari uses in its version of *Space Invaders*.

"On the hardware side, there is now the new 1200XL machine. You will definitely see that in this country, though probably not until the Autumn. In line with Atari's philosophy, it is software-compatible with both the 400 and 800 machines. There are also new peripherals — a new plain-paper, four-colour, printer and a new cassette deck.

"Also, as of the back end of last year, Atari has its own semiconductor division ■ Sunnyvale, California — so now we are in a position ■ design our own custom chips and reduce development times. We are also one of the few companies investing money ■ long-term software development.

"On our home computers we have some of the best games available — *Space Invaders, Galaxians, Missile Command, Asteroids, Pac-Man* and *Centipede*. Some are our own. But we are prepared to go to other coin-op companies and buy licences. We pay a lot of money for such licences and operate in ■ proper business-like manner."

For this reason Atari has begun to take action in the UK and in America to protect its interests — its copyright and its licences.

"Instead of people looking at our action as Atari playing the big bad Daddy, people should be asking themselves: where ■ software development going to go if everyone keeps ripping off the same programs? Software must go forward — people have to sit down and come up with their own games.

"The situation is changing though. Licensing agreements are becoming accepted. Take *Frogger* — one of last year's biggest arcade games. We don't have the rights ■ produce a *Frogger* game — and so we haven't. Parker got the licence for the home video game and Sierra On-Line got the licence for home computer games.

"A problem is that there isn't much point in spending a lot of money on a licence if you haven't got the hardware to do the game justice. This ■ why Atari has such a depth of software — we are one of the very few companies around that has hardware capable of producing an acceptable version of an arcade game. There would be no point in Sinclair spending a lot of money on a licence to make a ZX81 version of some fantastic vector-plotted arcade game!

"But the major companies are beginning ■ see the light. For the smaller software houses it is now a question of how close to the wind they can sail.

"It seems inevitable that you will have clones of the best programs — the only consolation is that it ■ an indication that you are doing it right! But it seems strange. Something truly original *must* be more profitable at the end of the game.

"In the States we are now having a remarkable amount of success with clear cases of passing-off. In the UK we have been very successful out of court — many software houses have been sensible.

"This isn't Atari waving the big stick. It has made people aware that a system is beginning to develop within the industry and that these programs are not public domain.

"Anybody who puts out a program tomorrow based around one of the Disney characters would expect some action against them. Whey should they think they can do the same sort of thing to Atari?" ■

Sinclair's little mascot

***Tony Bridge** trips the light fantastic in search of Spectrum software.*

Much of the success of the Sinclair machines, apart from sheer value for money, has been due ■ the wide range of software available. Any of the machines now snapping at Sinclair's heels will have to do battle with software catalogues as their main weapon. With the knowledge gained from the ZX80/81, programmers have seized the Spectrum by the throat, and taken full advantage of its colour, graphic and sound capabilities to produce programs that were undreamt of a few months ago.

Many of these programs are updates of ZX81 software, with some authors taking full advantage of the colours available, the high-resolution graphics and the huge extra memory of the 48K version. ICL's tapes, marketed by Sinclair themselves, take advantage of none of these, and are as abysmal as the same programs were for the ZX81. Other software manufacturers working under the Sinclair banner are, thankfully, more ambitious.

Psion has retained its position, and my vote, as one of the best software houses around, with several new tapes for the Spectrum. *Flight Simulation*, which was my favourite program for the ZX81, now receives a much-welcomed update for the 48K Spectrum.

For those of you who did not see the earlier version, the program's scenario has you in the Captain's seat of a single-engined light plane, with a limited amount of fuel, and the job of landing the plane properly. Using 40K of memory, the new version is even more stunning than the old. Now there are two airports to land at, Main and Club — rather than the single one of the ZX81 version — and lakes and hills are dotted around the countryside.

On loading, you are presented with the choice of three modes — starting in level flight, on final approach, or about to take off. You may also elect to have wind effects. An instrument panel is presented to you, containing all the dials you will need for your flight — fuel and power gauges, flap and landing gear indicators and instrument landing system.

As you approach your finals, the instrument landing system will show your plane's position relative to the correct glide-path. If you dip below the central line, you will have to put the aircraft's nose down to steepen your angle, and so on.

A large central dial ■ dedicated ■ the navigation system, and shows your position ■ regard ■ the beacons set at strategic points around the flying area. At any time you may call up a map, and you will see your position, shown by a little flashing plane. The beacons and the landmarks are also shown. The lakes and hills will appear in full perspective, as will the runway when you finally reach it.

Words, however, cannot do justice to this program, which apparently took some eight thousand man-hours to complete! The feeling of actually flying a plane is very strong — after some practice I eventually managed to land the ZX81 version fairly regularly, but I have not got close to a successful completion in the Spectrum Flyer. *Flight Simulation* is surely the best of its type, and is unreservedly recommended (not least for the quote from my previous review of the ZX version which appears on the present version's artwork)!

As a direct contrast, let's leave Psion/Sinclair for a moment and look at another flight simulation program. Again, this ■ an updated version of a ZX81 program. *Nightflite*, from Hewson Consultants, is written for the 16K Spectrum, and the restrictions placed upon the programmer by the smaller memory are painfully obvious when compared with the Psion tape.

An instrument panel is presented to the player, but consists of digital readouts of speed, height and so on. There is also a square artificial horizon and instrument landing system, together with a circular automatic direction finder. No view is offered from the cockpit window until the final approach, when the lights of a runway and a neighbouring village may be seen.

This view moves unrealistically at one "frame" a second, unlike Psion's smooth 3D movement.

The keyboard is read only once every two seconds, and only one direction movement ■ made at a time, thus making it impossible to bank and dive at the same time. While the "feel" of flying is absent from this program, the navigation aspect is emphasised, making it more of an academic exercise than Psion's thrilling "seat-of-the-pants" simulation. The provision of a map, at the end of your flight, is also a feature which Nightflite provides and which is absent from the Psion program: this, though a nice touch, is not enough to sway me from the Psion tape.

Tony Bridge.

To return now to Sinclair's own updated programs, we come next to *Reversi*, by MOI (Mine Of Information). What was a generally well-received version for the ZX81 has become a very sophisticated program for the 16K Spectrum. Also known at *Othello*, this an an absorbing board game of territorial possession, played on a battlefield ■ squares like chess. The computer plays a good game, or you may choose to play against a human opponent. There ■ a useful option to review all the moves of a game, and you may also take over and continue play from any point.

Other companies, too, apart from Sinclair, have been busy translating ZX81 programs ■ the Spectrum. One of these is Microgame Simulations, with *Battle of Britain* for the 48K model. This program puts you in command of *the few* Allied fighters against the *mean and many* German bombers at the start of World War 2.

In the ZX81 version, information scrolled up the screen, and the movements of the opposing squadrons were worked out by the player on a separate map. With the Spectrum's extra memory and hi-res graphics, it is now possible ■ show the map (of South-East England) on-screen. Sound may be requested by the player, which takes the form of Morse code transmissions, but this slows down the action so much as to become a little-used option for most people.

Battle is joined when squadrons of fighters are within one square of ■ wing of bombers. I found it hard to tell just where the bombers were heading for, and which targets I should be protecting. It was also a little disconcerting to see the enemy, which had been slowly approaching the coast at Eastbourne, suddenly disappear and reappear over a target at Gravesend, which of course was then obliterated. My poor squadron, which had been lying in ambush, was left wandering about 100 miles away! However, on talking to Microgame I understand that this is a deliberate

feature of the game. You are shown the enemy's last known position, not their current whereabouts.

If you enjoy strategic board wargames ■ the Avalon Hill variety, you will certainly enjoy this one — let's hope that Microgame Simulations gives us more programs of this type, for which there is surely a great demand.

Artic's Adventures (A to D) have sent many thousands of ZX81 owners to the edge of insanity with their near-impenetrable puzzles. Now the same Adventures appear under the Sinclair name, ■ the latest catalogue. While the other three Adventures have been written for the 48K model, thus pointing to more locations, Adventure A, or *Planet of Death*, is for 16K only. As far as I have progressed (the little slimy Green Man), the program seems to follow the same scenario as the ZX81 version. If you are an Adventure fan, then I urge you to look at Artic's offerings which, I guarantee, will have you screaming within half an hour!

Video Software, from that well-known metropolis, Kinver, has always been highly-regarded for its excellent Sinclair programs. *Superview* allows you to design and show your own Prestel-like information. Written for the 48K Spectrum the program gives you the choice of either 21 pages ■ full colour, or 42 pages in two colours.

Designing the pages at the computer takes a long time, so Video Software thoughtfully provides ■ pad of worksheets to ease the task. The full range of Spectrum attributes, *Flash*, *Bright*, *Inverse* and so on are available, plus an instant *Large Alphabet*. *Superview* will not support high-resolution, except any graphics that you may have designed before loading the main program — and these will have to be re-defined each time you wish ■ re-use that particular set of pages. However, even without the use of high-resolution, some impressive displays may be designed.

The sister program, *Superdraw*, will, as its name suggests, allow you to include high-resolution graphics, as the drawing cursor operates in pixel mode as well as the larger character mode. The same *Large Alphabet* is included, though this time there is provision for redesigning it to your own taste. You can then load this new alphabet into your *Superview* program. So, if you have the larger memory, I would recommend you obtain both programs to give you a totally flexible package.

The uses to which you can put the Prestel-style display are obvious — school fetes, exhibitions and so on. *Superdraw*, written for the 16K machine, will only hold one page at a time in Ram, but using the *Screen$* function will load a new page from cassette at a given interval, thus giving an illusion of a slideshow, albeit not as smooth and impressive as with *Superview*.

Tasimeq ■ from Tasman, makers of the well-known word-processor *Tasword*, for the ZX81. *Tasimeq* is an educational tool that originally appeared for the ZX81, and is designed to help students come to grips with simultaneous equations. Nothing much has changed from the original, except for the use of colour. Still an excellent program, however, and one of the few educational tapes for the Sinclair machines that actually does promote understanding. Recommended.

Jack Gibbons, with his *Personal Banking System* for the ZX81, had an enormous and deserved success. This was due not only to the program itself, which was extremely comprehensive, but also to the backup service that he provides to all purchasers. He has now released a version for the Spectrum which is equally good. A manual accompanies each tape to help you through ■ the features. The only detail I miss from the earlier version is the fast-loading of data which was managed by a machine-code routine courtesy of Picturesque. However, if there is only one home finance program you intend to buy, this should be it.

That rounds off our look at programs that have been re-written for the Spectrum — now let's turn to completely new programs, and look again at the Sinclair catalogue. Psion has really been burning the midnight oil and come up with several new tapes, some of which, *Planetoids* and *Hungry Horace*, have been reviewed in these pages ■ previous weeks. *Hungry Horace* looks like becoming Sinclair's little mascot, with the release of another *HH* game, *Hungry Horace Goes Skiing*. This program was written in collaboration with Melbourne House, which is rapidly gaining a reputation for imaginative software.

This time our little hero has to cross a busy 6-lane highway (where have you heard that before?), ■ order to reach a little ski shop where he can purchase skis, for the second part of the game. He starts with $40 (why not £s?) and will need $10 to buy the skis. In crossing the road, *Horace* will probably, under your guidance, get run down, in which case an ambulance will rush out and pick him up — asking for a fee of $10! Should this make you bankrupt, you cannot go on to the second part, which is a downhill ski race.

Points are scored for doing the right things at the right time and, of course, it is not as easy as it looks! Like the original *Hungry Horace*, this is an amusing twist on a, by now, rather long-toothed original (or rather, *two* LTOs), and will certainly tone up your reactions. I think we can look forward to more *Hungry Horace* games.

To the *VU* series *(VU-Calc* and *VU-File)*, Psion/Sinclair has now added *VU-3D*. This is a "very impressive three-dimensional modelling program", to quote from Sinclair's catalogue, and that says it in a nutshell. The user can design an object, and then view it in perspective and from ■ angles, and zoom in and out. The object may be displayed in "wire-frame" or as a solid, and shaded as required.

The drawing-board is fairly comprehensive, although a little practice is required to make full use of its capabilities. The finished model may be *Saved* for later amendment, and hard copies taken. The program makes excellent use of the Spectrum's resolution, which, admittedly, ■ not of the highest, a■ would be extremely useful on an engineer's desk — stunning value at the price!

David Miller, of Gwent, sent ■ three tapes for review (he has released another five, with ■ new machine code game on the way). *Plane Attack* is yet another re-working of the *Bomber* program (an LTO if ever I saw one!), in which a plane is, for some selfish reason, attempting to raze a city of skyscrapers so that it may land. This version has a couple of new features — you may move the plane up and down ■ a limited way, and the city fires back. But, on our copy, the user-defined graphics refused to load properly.

Patience and *Bio-Rhythms* are fairly self-explanatory and hold no surprises. As part of a larger compendium of games these three might be worth looking at, but on their own they are simply not good value for money. Better to save your money for . . .

Arcadia, from Imagine Software. As you may have guessed, this is a Liverpool-based company, formed by three ex-Bug-Byte colleagues. The promise of the eye-catching artwork is fully realised in the program. The avowed aim of this new company is to bring you only totally original arcade games. *Arcadia* is of the Space Zap variety, in which you control a space ship protecting your planet from marauding hordes of invaders. However, the stunning graphics lift this game into a class of its own.

You have five lives, and you will need all of them as wave upon infinite wave of amazing aliens descend upon you, most of them dropping bombs as they do so. In the

first level, the aliens are standard space vessels, and you get one point for each alien destroyed (in successive waves, you get more points). A counter at top left ticks down from 99 to 0, at which point the aliens give up with the puny first wave, and launch the second wave, which consists of giant bomb-dropping, multi-coloured butterflies, would you believe?

Successive waves consist of Nasty Nails, 'Orrible Octupuses and — well, find out for yourself! Suffice to say that some of the higher levels are so deadly that they don't even need to drop bombs! There are a lot of surprises — for instance, somewhere in the higher levels is a mini-*Centipede* game. Luckily, Imagine provided a special review copy, written just for arthritic-fingered old reviewers (OK, just like me!), giving the player 99 lives — on the first playing I have to admit that I ran out of all of them before the 12th level!

The stunning graphics have no equal in the Spectrum field, and are as good as any Atari game, and that is the highest praise that I can give. Imagine Software has, with this program, certainly emulated the genius of their namesake's composer. Eugene Evans of Imagine tells me that *Schizoids*, the latest Spectrum game from his company, is twice as good as *Arcadia* — just imagine . . .!

Staying with the arcade games, we come to *Gnasher*, from R&R Software. This is a version of *Pacman*. The graphics are faithful to the original, down to the fruit at the bottom run of the maze, which have to be devoured for extra points. They also appear beneath the maze, to remind you which level you are currently negotiating.

The ghosts will chase you relentlessly, and the game is very addictive as you try desperately to outrun them and beat the high score. A *Hold* feature is included so you can take a breather, and you can also *Save* your high score for posterity. This program proved to be a favourite with all the neighbourhood arcade-gamers, and is well worth the asking-price.

We shall take a breather now, and slow things down a little with *ZXTrek*, from Cleva. The game of *Startrek*, or Klingon-bashing, has been around since the earliest days of the big mainframes, and was one of the first games available for microcomputers. Peter Lovett, the author of this latest, but surely not last, version has taken full advantage of the larger memory of the Spectrum to produce a more detailed game than usual. The Battle Manual (documentation) alone runs to nine pages, and is very L-O-G-I-C-A-L!

The display on the screen is devoted to long-, short-, and Galaxy-scanners, and an awful lot of information about the state of the Enterprise (and Life and the Universe) is shown to the player. As you will know, the aim is to rid the Universe of the Klingons — here they are aided by the dreaded Romulans, which appear without warning to wreak havoc. A typically slow trudge of a game, but if, like me, you enjoy *Startrek* programs, you'll find this one more interesting than most.

Haven Hardware offers *Patience* and *Fruit Machine*. The latter is fairly ordinary, being an unsurprising simulation of a one-armed bandit, which is very similar to those found in many books for the Spectrum. *Patience* is a much more interesting program, which shows off the Spectrum's graphics. Cards are laid out in several descending rows, containing one to seven cards. The remaining cards are held in a pack which is turned over, three cards at a time.

Cards may be placed on any of the rows, as long as they are of a different colour and one rank lower than the immediately preceding card. Aces are placed on one side. As in real Patience, your game depends on luck, in the early stages — in the later stages, on laying the right card on the right pile. When you feel like passing a quiet couple of hours, load *Patience* in and settle back.

Case Computer Systems of London has added a couple more programs to its range of management simulations. The first, *Dallas*, continues in the tradition.

As you might expect, this one deals with the vagaries of the oil business in Texas. This is more of a board game than the other games in the series, *Autochef*, *Airline* and *Print Shop*, and is a direct descendant of those well-loved property acquisition games. A fine balance must be sought between prospecting for more black gold, and developing the fields already struck. All the while the Ewing family is sneakily building up their resources, and your aim is to eventually become worth more than JR (lovely thought!).

CCS's other new release is a departure from its usual games programs, though it still involves the world of high finance. *Financial Modeller X* comes in both 16K and 48K versions. A hefty manual explains how to use the programs. Designed mainly for management trainees, or indeed any manager wishing to make forecasts about his business, the program allows several models to be designed.

Data is input by the user, about advertising expenditure, sales force, production capacities and so on. The computer will then act upon the data, make forecasts concerning the profitability of each model, and compare one with another. Hard copies may be taken, thus building up a comprehensive profile of financial options. Good value for money.

Richard Shepherd Software, of deepest Maidenhead, has had an extensive catalogue of Sinclair software for some time, and has now released several programs for the Spectrum, mostly Adventure games. In *Shaken not Stirred* (48K), you are cast as James Bond, and your task is to seek out the island of the dreaded Dr Death, who is threatening London with extinction unless his ransom demand is met. You may choose three weapons with which to fight the many foes you will meet on your journey around the world.

Transylvanian Tower is set in Dracula's castle and is a graphic maze-cum-Adventure game. There are several levels

Firm	Program	Cost
Psion 2 Huntsworth Mews Gloucester Place London NW1	*Flight Simulation* *VU-3D*	£7.95 £9.95
Psion Melbourne House 2 Huntsworth Mews Gloucester Place London NW1	*Hungry Horace Goes Skiing*	£5.95
Imagine Software Masons Buildings Exchange Street East Liverpool L2 3PN	*Arcadia*	£5.50
Microgame Simulations 73 The Broadway Grantchester Cambridge CB3 9NQ	*Battle of Britain*	£5.95
Video Software Stone Lane Kinver Stourbridge West Midlands DY7 6EQ	*Superdraw* *Superview*	£5.00
R & R Software 34 Bourton Road Tuffley Gloucester GL4 0LE	*Gnasher*	£4.95
Richard Shepherd Software 22 Green Leys Maidenhead Berkshire SL6 7EZ	*Shaken not Stirred* *Transylvanian Tower*	£6.50 £6.50
CCS Software 14 Langton Way London SE3 7TL	*Dallas* *Financial Modeller X*	£5.00 £8.00
Calpac 108 Hermitage Woods Crescent St Johns Woking Surrey GU21 1UF	*Junior Education*	£5.50

to the castle, each one containing a matrix of 100 rooms. As you explore the castle, each room is presented to you in 3D graphics. You must work your way through the complicated structure, picking up treasure and fighting off the weird animal life.

The battle sequences with the fauna are arcade-like, rather than relying on the traditional hit-point system. Three objects may be carried by you, and it is up to you to decide which will be most useful in your quest. Occasionally, you are allowed a short glimpse of a plan of the level you are currently on, but this option is a luxury, and not to be used lightly. An enthralling and addictive program.

Several books are now available for the Spectrum programmer, and some of these also offer tapes to save tired fingers the drudgery of typing. The *Spectrum Pocket Book*, by Trevor Toms and published by Phipps Associates, is one such book, and is the latest in a series of extremely good volumes for the whole Sinclair range and the Atom. The first part of the latest book concentrates on games, the listings of which are fully annotated. Thus you can apply the techniques used in the programs to you own efforts.

The second part of the book introduces you, very gently, to machine code programming. Tapes are available for both sections, one containing the games *(Great Fire of London, Castle Walls, Reversi* and so on), and the other the Machine Code routines — Assembler, Disassembler, Monitor and Screen Tool Kit. The games are all original, and good fun to play. The machine code section itself is worth the price of the book.

If you are prepared to type in the lengthy programs yourself, you need never buy another expensive piece of software to help you program in machine code, but Phipps's own tape is extremely good value, and highly recommended to anyone at all interested in this branch of programming. A word of warning, however: instructions for using the tapes are contained within the text of the book, so you will need to invest in both tape and book to gain the full advantage.

The second educational tape in this current survey comes from Calpac. *Junior Education* contains eight programs for the 8 to 11 age group. Subjects covered include mathematics *(Tables)*, spelling *(Homophones)*, and history *(Romans)*. All are supported by charming animated graphics, and good colours and sound. Just what kids like, in fact, but here they are not talked down to. A varied and worthwhile selection of programs, recommended for home education.

Finally, a tape that I have to admit I cannot approach objectively — *Popular Computing Weekly*'s own collection of favourite programs from its pages. There are four games here, two for the ZX81, and two for the 16K Spectrum — *Laser Chase* and *Kong's Revenge*. The former is a rarity, a two-player game — a sort of surround with bombs — which should appeal to the sadists among you. The object, of course, is to fence in your opponent.

Kong's Revenge is, as you may have guessed, a version of the arcade game in which you have to guide your little man up the ladders, while Kong throws barrels down at you (why he doesn't jump down and give you a friendly little squeeze is not explained!). Along the way you may pick up parasols conveniently dotted around, thus gaining more points. The first level is hard, and subsequent levels are near impossible for me to negotiate. The game is extremely addictive, and a great favourite with the kids, who seem to play with their eyes shut!

Firm	Program	Cost
Hewson Consultants 60A St Mary's Street Wallingford Oxon OK10 0EL	*Night Flight*	£5.95
Hilton Computer Services 14 Avalon Road Orpington Kent BR6 9AX	*Personal Banking System*	£10.00
Artic 386 James Reckitt Avenue Hull North Humberside HU8 0JA	*Planet of Death*	£6.95
Mine of Information 1 Francis Avenue St Albans Herts AL3 6BL	*Reversi*	£7.95
Phipps Associates 99 East Street Epsom Surrey KT17 1EA	*Machine code tools*	£5.00
Cleva Computer Ware 34 The Avenue Loughton Essex	*ZXTrek*	
Haven Hardware 4 Asby Road Asby Workington Cumbria	*Fruit Machine* *Patience*	£4.95 £5.95
Tasman Software 17 Hartley Crescent Leeds LS6 2LL	*Tasimag*	£3.30
DPM Software 641 Morrow Way Bettws, Newport	*Biorhythms* *Plane Attack* *Solitaire*	

Summary

It is obvious that the software writers have grown up along with the Spectrum — it is no longer enough to simply shove out another *Space Invader* program. While the old favourites still have their place, companies like Imagine are showing us that there are now arcade games to become addicted to, and of a higher quality than ever before. On the "serious" side, too, the Spectrum has a lot to offer, and is being well served by most of the companies in this survey. ■

NEW SPECTRUM AND ZX81 SOFTWARE

"WINGED AVENGER"

Fast and furious. SPECTRUM version has SOUND and USER GRAPHICS. 7 LEVELS, 3 WAVES, MOTHER SHIP, HIGH SCORE, RE-FUELLING, RAPID FIRE, SMART BOMBS and LASER SHIELD. PCW "ONE OF THE BEST SINCLAIR GAMES YET" Only £4.50. All SPECTRUM + 16K ZX81.

"SPECTRUM SCRAMBLE"

MORE M-CODE ARCADE ACTION "SO GOOD THE REVIEWERS DIDN'T REACH THE FINAL STAGE" (NOT BAD EH!) NO LESS THAN 8 DIRECTIONAL KEYS for a SMOOTH MOVE. Full ARCADE features including: LASERS BOMBS INSTANT RESPONSE, CONTINUOUS SCORING, ROCKETS, SOUND, FUEL DUMPS RED METEORS, DEFENDER CRAFT and HIGH SCORE. Beware CONDITION RED. With this one you MOVE, FIRE and BOMB AT THE SAME TIME. RELEASE PRICE of £4.95. 16K or 48K SPECTRUM.

"DO NOT PASS GO"

NOW THE 48K SPECTRUM VERSION IS READY

A COMPLETE SIMULATION of the BEST SELLING BOARD GAME you know PARK LANE and all that. Up to SIX PLAYERS can compete with the MICRO doing all the WORK. Acts as DICE THROWER, BOARD RENT COLLECTOR, UMPIRE, BANK, RULE BOOK, ACCOUNTANT and PROPERTY RECORD. SUPER GRAPHICS by Gary Kennedy (thanks mate). GAME SAVE with winner so far report. COMPLETE with INSTRUCTION BOOKLET. The ULTIMATE in FAMILY GAMES. Don't MONOPOLISE YOUR MICRO. AMAZE all your friends and family. (Can you see your GRANNY on a MICRO?) ONLY £6.95. 16K ZX81 VERSION ALSO £5.95.

"BASE INVADERS"

The ONLY ARCADE GAME EVERYBODY SHOULD HAVE. The SCREEN'S the same, THE INVADERS are the same, BUT you get a SHIELD and a CHOICE of THREE SPEEDS, (O.K., FAST or INCREDIBLE!) GOOD SOUND, a HARD GAME, and GREAT GRAPHICS. COMPLETE your software collection for just £5.50. 16K and 48K SPECTRUM only.

"AUDIO SONICS"

WINNER of WIZZ KID. For the SPECTRUM. A.S. writes sound effects for your own programs. 26 PRE-SELECTED SOUND EFFECTS include TELEPHONE, POLICE SIREN, FROG, SPACE EFFECTS and OUTBOARD MOTOR. GO into MODIFY and you are presented with a display of SLIDER CONTROLS to adjust PITCH, RISE, FALL, BRISKNESS, DECEL, ACCEL, TONE, REPEAT RATE, STUTTER and DELAY. ADJUST the SLIDERS then INSTANTLY hear the SOUND CREATED. Call it "THE SOUND ONE" and a program line will appear that is ready for insertion into your own programs. Hours of EXPLORATION. YOU WILL BE AMAZED what BEEP can DO. We are proud to offer this at £4.99. 16K or 48K SPECTRUM.

"SPECTRUM RENUMBER DELETE"

All M-CODE. RENUMBERS ALL NOT PART. "YOU WON'T BUY A BETTER" RENUMBER PROGRAM FOR THE SPECTRUM. JUST 600 BYTES. At £4.95. ALSO ZX81 VERSION.

"HIGH NOON"

When YOU'VE SAVED the GALAXY, SCRAMBLED or whatever else you do on your MICRO, what about a GUNFIGHT? Play the SPECTRUM at YOUR PALS. THREE LEVELS. PULL FEATURES, CACTI, COFFINS, WAGONS, RAPID or SINGLE SHOTS. SUPERB GRAPHICS. GOOD SOUND including DEATH MARCH. ESCAPISM on TAPE for JUST £4.50.

"DISPLAY"

Takes over when BIN and the DEMO tape left off. How would you like 273 different user defined GRAPHICS on a 16K SPECTRUM or a GRAND 336 for a 48K. All of these can be displayed on the screen at the SAME TIME. UDGs are stored as PAGES and any TWO PAGES may be exchanged in memory. FILES can be LOADED FROM or SAVED TO TAPE. LOAD into any page location. TURN a UDG ¼ turn, ½ turn. FLIP a SHAPE over, REVERSE a SHAPE, EXPAND ¼ of a CHARACTER into a full character. UP, DOWN, LEFT or RIGHT by one PIXEL. 5 SHAPE FILES are included on TAPE INCLUDING a 64 CHARACTERS per LINE DISPLAY. COMPLETE with DEMO PROGRAM and INSTRUCTIONS. JUST RELEASED at £7.00. 48K or 16K SPECTRUM only.

"TRaceON"

BASED on a FILM (GUESS WHICH) TRaceON is a REAL TIME ADVENTURE for those of you who can't handle ARCADE GAMES. Your TASK is to COMPLETE a TRILOGY of GAMES successfully. A poor PERFORMANCE will result in a RESTART as may CHEATING. MASTER DISKS and YOU get to ride a LIGHT BIKE and then RUN the CORRIDORS of DEATH to reach the MASTER CONTROL. REALLY GOOD FRUSTRATING FUN. 48K SPECTRUM £4.50 (16K coming soon.)

"MATCALC"

For BUSINESS and PROFESSIONAL use. Ideal for WHAT IF situations, CASH FLOW FORECASTS and analysing RELATED figures. 64 character display option. FORMULA may be MATHEMATICAL or LOGICAL. MENU of FUNCTIONS. SAVE and LOAD DATA to TAPE. FULL instructions included. LITERALLY HUNDREDS of USES. BOTH 48K and 16K SPECTRUM PROGRAMS on ONE TAPE. JUST £7.00. EXCELLENT VALUE.

"PROGRAMMERS DREAM"

A SPECTRUM TOOLKIT. Position independent and just 1450 BYTES. Facilities RENUMBER lines or blocks any increment or start. BLOCK OR LINE MOVE including a RENUMBER into place if required. BLOCK OR LINE ERASE. CHANGE SELECTED STRINGS (NAMES OR CONTENTS). DUMP variable names and values (usable in a loop). DISPLAY PROGRAM or PROGRAM plus VARIABLE SIZE. INSTANT and CLEAN. JUST £6.95 with explicit instructions.

WORK FORCE

140 WILSDEN AVENUE, LUTON, BEDS, ENGLAND

ALSO AVAILABLE AT BUFFER, MICROWARE AND SOFTWARE SUPERMARKET. REM WORK FORCE WORKS HARDER.

At last ... Exciting AND Challenging Computer Games for Two Players.

CONFLICT A total war for two players involving both the machinery (armies, missiles, warships) and finance (stock market, oil, piracy) of conflict. *"I enjoyed this strategy game" (Computer and Video Games)*

GALAXY CONFLICT Raise a fleet of Battle Cruisers then move from bridge to bridge taking full control and responsibility in this battle for the heavens. Born galactic rulers will do well. *"Galaxy battle scenario a trend" (Sinclair User)*

Games include ZX81 (16K) and Spectrum (48K) programs on ONE cassette. Full size professionally printed board. Counters and markers. Two pads disposable maps (Conflict only). Comprehensive instructions/rules.

Professionally packaged in high quality attractive box.

Each game only £1.95 inc Postage. £2.95 for pair of games.

Available from W. H. Smith, Buffer, Games Centres and many other retail outlets or mail order from:

martech games

9 Dillingburgh Road, Eastbourne East Sussex BN20 8LY

ZX81 Spectrum MANAGEMENT GAMES

DALLAS NEW!

A game of oil exploration and exploitation in Texas. Decisions are required on purchasing concessions, the movement and use of drilling rigs, and the building of platforms and pipelines. Can you take-over the Ewing Empire, or will you be taken-over in the attempt.

FARMER NEW!

is a simulation of running a large wheat farm. Decisions are required on when to plant, irrigate, fertilize, spray and harvest your land and whether to purchase seed corn, land or farm machinery, and whether to employ more farm workers.

MODELLER X Business Model

This is a user friendly business modeller which provides Managers with a tool to plan the strategic decisions of a business. The model shows the profit sensitivity and the interaction of the pertinent marketing and production factors of a business. A user manual is included in the price of the program.

PRICES

	16k	48K
ZX81 or SPECTRUM		
Dallas and Farmer	£5	£6
Modeller	£8	£9

DEDUCT £1.50 for two, £3 for three

C.C.S. DEPT P.C.
CASES COMPUTER SIMULATIONS
Langton Way
London SE3 7TL

Open Forum **is for you to publish your programs and ideas. Take care that the listings you send in are all bug-free. Your documentation should start with a general description of the program and what it does and then give some detail of how the program is constructed. We will pay the *Program of the Week* double our new fee of £6 for each program published.**

Fill

on Spectrum

This routine is a useful utility, which enables any Spectrum owner to fill the screen with a solid block of colour. All you need to do to get a shape on the screen is *Poke* the stated addresses with the required data and then LET L = USR 32000. The screen will be filled (or part of it).

An example is given in the listing which will produce a green block starting ■ 100, 100 and ending at 150, 150.

The program is very simple, as all it does is call the Rom plot routine (at 8933) repeatedly, until the specified dimensions are encountered, whereby it returns to Basic.

Alternatively, the routine can be called from a machine code program. The data will be directly *Poke*d, instead of using the loop. The colour requirements are fed into the machine using *Rst* 16 (in the first 6 bytes).

Fill routine

Poke 32004, n = the ink colour of the shape.
Poke 32007, n = the x co-ordinate of the bottom of the shape.
Poke 32008, n = the y co-ordinate of the bottom of the shape
Poke 32010, n = the x co-ordinate of the top of the shape.
Poke 32011, n = the y co-ordinate of the top of the shape E.G.
For a green shape with bottom co-ordinates at 100, 100, and top co-ordinates at 150, 150;
Poke: 32004, 4
32007, 100
32008, 100
32010, 150
32011, 150

Then LET L = USR 32000, and the shape will appear.

The machine code is:

Address	*Number*
32000	62
32001	16
32002	215
32003	62
32004	4
32005	215
32006	1
32007	100
32008	100
32009	17
32010	150
32011	150
32012	122
32013	144
32014	103
32015	123
32016	145
32017	111
32018	229
32019	197
32020	197
32021	245
32022	205
32023	229
32024	34
32025	241
32026	193
32027	12
32028	■
32029	32
32030	245
32031	193
32032	115
32033	125
32034	4
32035	37
32036	32
32037	236
32038	201

The machine code can be loaded using:

```
10 FOR a=32000 TO 32038: INPUT x: POKE a,x:
PRINT a,x:Next a
```

by M Skinner

Assembler

on BBC Micro

This program for the BBC Micro Model A or B assembles a short machine code routine into &D00 to &D34 which retrieves as much as possible of your Basic program after a "Bad program" error caused by accidentally *Poke*ing into the Basic program area or by a program which has not loaded correctly. Retrieve works wherever the program is in memory by looking at the value of *Page*.

So that Retrieve is ready for use when required type in the program as shown, *Run* it and then save a machine code version by *SAVE "Retrieve" D00 D35. When you wish to use it type *RUN and play the tape.

To use Retrieve to correct a program not saved on cassette correctly use the *OPT 2,0 command (see new *User Guide*, p. 398) which loads the program complete with errors and then *RUN Retrieve. In this way the greater part of a program which has block ■ missing due to the fault in the cassette filing system can be retrieved.

Program notes

30	Allows two passes of the assembler which is needed for forward branches
40	Sets start of machine code to &D00
60-90	Copies the value of *Page* into &70,&71
100-110	Load *Page* with &0D for start of line
120-160	Returns to Basic if end of Basic program found
170-230	Finds the length of the current Basic line
240-260	Adds end of program marker
270-280	Returns to Basic
290-320	Puts length of line in correct location
330-380	Sets &70,&71 to start of next line

```
>
  10 REM ******** Retreive *********
  20 REM *** (C) Neil Odell 1983 ***
  30 FOR PASS=0 TO 3 STEP 3
  40 P%=&D00
  50 [OPT PASS
  60 LDA&18
  70 STA&71
  80 LDY#0
  90 STY&70
 100 LDA#&D
 110 STA(&70),Y
 120 .LOOP1
 130 LDY#1
 140 LDA(&70),Y
 150 CMP#&FF
 160 BEQ FINISH
 170 LDY#4
 180 .LOOP2
 190 LDA(&70),Y
 200 CMP#&D
 210 BEQ PUTBYTE
 220 INY
 230 BNE LOOP2
 240 LDA#&FF
 250 INY
 260 STA(&70),Y
 270 .FINISH
 280 RTS
 290 .PUTBYTE
 300 TYA
 310 LDY#3
 320 STA(&70),Y
 330 CLC
 340 ADC&70
 350 STA&70
 360 BCC LOOP1
 370 INC&71
 380 BCS LOOP1
 390 ]
 400 NEXT
```

Assembler
by Neil Odell

Peeks and Pokes

on Dragon

PROGRAM 1
AUTOREPEAT KEYS
I think this may be the answer Peter Chase was looking for (ref. page 25, vol. 1, no. 36). Line 20 indicates if a key is pressed, whilst line 30 prints the character pressed. It is line 40 which allows the second repeating key to function before the first is released. The reason for this becomes clear in program 2.

PROGRAM 2
PEEK (337) to PEEK (345)
In order to fully explore these *Peeks* it is best to take them one by one modifying line 30 each time. Run the program and make a table of the *Peeked* values for each key. You will find for example that when *Peek* (337) = *Peek* (339) the 'A' key is pressed.

PROGRAM 3
SCREEN POKEs
It is possible by *Poking* direct to the text screen memory to obtain inverted characters not available by printing *Chr$* codes or direct from the keyboard. Run program 3 and the top half of the screen will be the *Chr$* characters whilst the bottom half will be the *Poked* characters. Notice the extra line in the bottom half? Make a note of the *Poke* codes as some of these differ from the *Chr$* codes.

PROGRAM 1
```
10 CLS
20 IF PEEK (337) = 255 THEN 20
30 PRINT CHR$ (PEEK (135));
40 POKE 337, 191
50 GOTO 20
```

PROGRAM 2
```
10 CLS
20 K$ = INKEY$: IF K$ = "" THEN 20
30 PRINT K$; PEEK (337),
40 GOTO 20
```

PROGRAM 3
```
10 CLS
20 FOR N = 0 TO 255
30 PRINT CHR$(N);: NEXT
40 C = 0: FOR P = 1280 TO 1536
50 POKE P, C
60 C = C + 1: IF C > 255 THEN C = 0
70 NEXT
80 GOTO 80
```

by Brian Beesley

Earth Attack

on Vic20

The controls are:
CRSR UP which moves the base to the left.
CRSR RIGHT which moves the base to the right.
The space bar is used to fire.

20 to 30	Read data characters
92 to 94	Print Mother Ship
140 to 200	Define the Invaders
210 to 220	Position of Invaders
260 to 280	Check for movement of base
300	Check for missile
310 to 311	Draw missile and check for hit
330 to 350	Check if Invaders land
510 to 520	Destroy Invader
600 to 730	Winning display
800 to 880	Title set-up
1000 to —	Losing display

```
1 GOTO800
5 POKE 36878,15
10 PRINT"J";
20 A=7168:B=7175:FORT=1TO6
30 FORAA=ATOB:READS:POKEAA,S:NEXT:A=A+8:B=B+8:NEXT
40 DATA129,66,60,126,219,255,126,129
50 DATA16,16,56,124,124,254,254,254
60 DATA16,16,16,0,0,0,0,0
70 DATA146,84,0,198,0,84,146,0
80 DATA0,0,0,0,0,0,0,0
85 DATA255,255,255,255,255,255,255,255
90 POKE36869,255
92 PRINT"EEEEEEEE[illegible]EEEEEEEE";
93 PRINT"[illegible]    |          | "
94 PRINT"[illegible]    ⊥          ⊥ ";
100 S=30720
110 D=8174
120 Y=7780
130 Z=0
140 FORI=1TO3:X(I)=0:NEXT
200 W=0:P=0
210 FORI=1TO3
220 POKEY+W-1,4:POKEY+W,X(I):POKEY+W+S,5:W=W+14:NEXT
222 POKE36874,128
230 Y=Y+1
260 GETA$
270 IFA$="[illegible]"THEND=D-1:POKED+1,4
280 IFA$="[illegible]"THEND=D+1:POKED-1,4
285 POKE36874,0
290 POKED,1:POKED+S,0
300 IFZ=0ANDA$=" "THENPOKE36876,140:
    R=D-22:Z=1:POKE36876,0
310 IFZ=1THENPOKER+22,4:POKER,2:POKER+S,2
311 FORI=1TO3:IFZ=1ANDR-2[illegible]=Y+PTHENGOSUB500
312 P=P+14
313 NEXT
319 R=R-22
320 IFZ=1ANDR<=7746THENPOKER+22,4:Z=0
330 IFX(1)=0ANDY>8185THEN1000
340 IFX(2)=0ANDY+14>8185THEN1000
350 IFX(3)=0ANDY+28>8185THEN1000
400 GOTO200
500 IFX(I)=4THENRETURN
510 POKE36877,222:POKER-22,3:POKE36877,0:
    POKER-22,4:X(I)=4
515 IFX(1)=4ANDX(2)=4ANDX(3)=4THEN600
520 RETURN
600 FORY=140TO222:FORT=1TO12:POKE36875,
    Y+T:NEXT:NEXT
710 FORY=15TO0STEP-1:POKE36877,220:POKE
    36878,Y:FORT=1TO200:NEXT
720 PRINT"[illegible]
730 NEXT
800 POKE36869,240:PRINT"J"
805 POKE36877,0:POKE36875,0
810 PRINT"[illegible]EARTH ATTACK"
820 PRINT"[illegible]   CRSR UP-LEFT"
830 PRINT"[illegible]   CRSR LEFT-RIGHT"
840 PRINT"[illegible]   SPACE BAR TO FIRE"
850 PRINT"[illegible]     [illegible]HIT A KEY"
860 GETA$:IFA$=""THEN860
870 FORT=220TO140STEP-1:POKE36874,T:
    POKE36876,T:NEXT
880 POKE36876,0:POKE36874,0:RESTORE:GOTO5
1000 FORY=1TO5
1010 FORR=240TO140STEP-1:POKE36874,R:NEXT:
     NEXT:POKE36874,0:GOTO800

READY.
```

Earth Attack
by Emile Wakefield

Bounce

on Vic 20

The object of the game is to get the ball to the bottom right-hand corner, rebounding off bricks, bats etc., watching out for the stars which will make the ball appear in a different place. The best time achieved is 8 seconds — try to beat it. The game uses the Vic sound and colour capabilities well.

Variables

X	For next loops
Z	Peek (197)
HS	High Score
NA$	Name
A	Position of ball
B	Movement of ball
AA	Bat Position
BB	Bat Movement
T	VAL (TI$)
AC	Star Position

```
0 PRINTCHR$(8):POKE36878,15:NA$="NOBODY"
10 REM**************
15 REM*             *
20 REM*  BOUNCE     *
25 REM*             *
30 REM*    BY       *
35 REM*             *
40 REM*  STEVEN     *
45 REM*             *
50 REM* CRANSHAW    *
55 REM*             *
60 REM**************
65 GOSUB440
70 HS=99
75 POKE36879,25:PRINT"■"
80 FORX=7680TO7701
85 POKEX+30720,2
90 POKEX,160
95 POKEX+484+30720,2
100 POKEX+484,160
105 NEXT
110 FORX=7698TO7859STEP22
115 POKEX+30720,2
120 POKEX,160
125 POKEX+30741,2
130 POKEX+21,160
135 NEXT X
140 FORX=1TO120
145 B=RND(-TI):B=INT(RND(1)#586)+7698:IFPEEK
    (B)=160THEN145
150 POKEB+30720,6
155 POKEB,160
160 NEXTX
165 FORX=7783TO7786
170 POKEX,32
175 POKEX+22,32
180 POKEX+44,32
185 NEXTX
190 FORX=8159TO8162
195 POKEX,32
200 POKEX-22,32
205 POKEX-44,32:NEXT
210 FORX=8094TO8096
215 POKEX+30720,6
220 POKEX,160
225 NEXT
230 POKE8162,87:POKE38982,6
235 A=7703:B=1:TI$="000000":AA=8116:BB=22
240 PRINT"■■■ TIME":VAL(TI$);TAB(10)"■BEST
    TIME"HS
245 PRINT"■■■
```

upgrade to an ORIC-1

16 colours
professional keyboard
full graphics
real sound

FROM £99.95 incl VAT

ORIC is no toy! Its pr... language and extensive specification will do all you expected of your home computer, plus a whole lot more... For home, educational business and games use.

If you're buying for the future beware! Only ORIC computers offer full colour capability for under £100 and the most powerful and comprehensive micros in their price brackets.

So whether you're just starting out, or upgrading existing equipment, make the professional decision and choose ORIC. Send for our comprehensive brochure NOW, or better still, order your ORIC today. Delivery is around 28 days with a money back guarantee if you're not delighted.

ORIC-1

Clip the coupon below, or call our telesales number ASCOT (0990) 27641.

The Real Computer System

ORIC PRODUCTS INTERNATIONAL LTD

Prices include VAT			
	ORIC-1 16K RAM	£ 99.95	
	ORIC-1 48K RAM	£169.95	
	ORIC Communications Modem	£ 79.95	
	Postage and Packing		£ 5.95
		TOTAL	£

*Please delete/complete as applicable
*I enclose a cheque/P.O payable to: ORIC PRODUCTS INTERNATIONAL LIMITED for £_____

Please charge my Access, Barclaycard Amex, Diners Club account no.

Name

Address

If you require a brochure please tick ☐ P C W W

© Copyright ORIC PRODUCTS INTERNATIONAL 1982

Screen-copying

on Spectrum

The Spectrum manual states that you can't *Peek* or *Poke* the screen. Well, you can and this short demonstration program shows this, by copying the top third of the screen to the middle third. Whilst not very inspiring in itself, this should give you enough of a clue to a routine that will *Peek* any *Print* position and return the true character value, which of course, *Screen$* will not do.

Enter the short program and put anything you like in the *Print* line 10. *Run* will copy the top third to the middle and erase the top as it does so. You will see that the screen is built in the same manner as loading the screen area (when a screen — save has been made). This should provide enough clues also as to which bytes to *Peek* or *Poke*. An example would be to copy anything on a given line to another, or to build the true *Screen$* value of a graphic character. Another example might be mirror-imaging of lines or individual characters.

Screen Copying
by Paul Newman

```
    1 REM SCREEN COPYING - BY POK
ING THE DISPLAY FILE.
    2 REM
   10 PRINT "This is just to fill
 up the screen with lots and lot
s of pretty writing.We are going
 to copy this to the middle thir
d of the screen.This illustrates
 that you can POKE the screen,wi
th care."
   50 FOR j=2048 TO 4096
   60 POKE (16384+j),PEEK (16384+
(j-2048))
   65 POKE (16384+(j-2048)),0
   70 NEXT j
   80 PRINT AT 20,10;"OK"
```

Replace$

on ZX81

Replace$ is a machine code routine which can be very useful in games programs. Every time the character stored at address 16526 is found in the Display File it is replaced by the character stored at address 16530. This routine may be adopted when one wishes to obtain such special effects as making a pacman ghost or an alien space ship flicker from inverse to normal without affecting the rest of the Display File, or on any occasion when specific characters in the Display File need to be changed.

To use this routine, enter and run program 1. Now delete all except line 1 and enter program 2 (which is a subroutine to run the machine code).

The variable A should contain the character code of the characters to be replaced. The variable B should contain the replacement character.

Program 1

```
 1 REM (23 M's)
 2 LET P=16514
20 LET A$="06182A0C40237E6F7628099F002
   0F63E00771BF110EFC9"
30 POKE P, 16 CODE A$+CODE A$(2)-476
40 LET P=P+1
50 LET A$=A$(3 TO)
60 IF A$="" THEN STOP
70 GOTO 30
```

Program 2

```
9000 POKE 16526,A
9010 POKE 16530,B
9020 RAND USR 16514
9030 RETURN
```

A contains character code of characters to be replaced
B contains character code of replacement character

Address	Hex code	Instruction	Basic
16514	0618	LD B,24	LET B=24 (number of lines of screen)
16516	2A0C40	LD HL,(16396)	LET HL=PEEK 16396 (HL = start of DISPLAY FILE)
16519	23	INC HL	LET HL=HL+1 (first character in DISPLAY FILE)
16520	7E	LD A,(HL)	LET A=PEEK HL (A=character code stored at HL)
16521	BF76	CP A,118	LET A=A-118 (answer not stored anywhere and value of A is not affected)
16523	2809	JRZ 09	IF (value calculated by last instruction)=0 THEN GOTO 16534
16525	BF00	CP A,00	LET A=A-00 (answer not stored anywhere and value of A is not affected) Address 16526 contains the character code of the character to be replaced
16527	20F6	JRNZ -10	IF (value calculated by last instruction)<>0 THEN GOTO 16519 (goto next character if not character to be replaced)
16529	3E00	LD A,00	LET A=0 (LET A=replacement character) Address 16530 contains the character code of replacement character
16531	77	LD (HL),A	POKE HL,A (replace character)
16532	18F1	JR -15	GOTO 16519 (goto next character)
16534	10EF	DJNZ -17	IF B<>0 THEN LET B=B-1 and goto 16519 (if not at end of DISPLAY FILE then let lines=lines-1 and goto next character)
16536	C9	RET	RETURN

by John Hodgson

Asteroids

on ZX81

The object of this game is to travel as far as you can in your space ship dodging the asteroids as much as you can. You have laser cannons to help you.

You also have the option of hyperspacing twice, but this loses you 50 points. You can also travel at the speed of the asteroids for as long as you like but your score will go down rapidly.

When you finally crash the computer will tell you how well you did. There is a high score table.

The controls are:

4 fast left
5 slow left
8 slow right
9 fast right
f fire
h hyperspace

Program notes

1-5	Set up variables
6-8	Ask if instructions are needed
10-30	Set up variables
40-50	Print asteroids
60-80	Check screen and add up score
90-140	Check if key pressed
150-160	Slow up routine
170	Goto 40
9000-9120	Crash routine and comments
9200-9300	Hyperspace routine
9500-9550	Firing routine
9600-9800	Instructions
9820-9830	Save routine

The program must have been run before the *Save* routine can be used or the variable undefined error code will appear on reloading.

```
   1 LET HI=0
   5 LET U$=""
   6 LET C=0
   6 PRINT "INSTRUCTIONS?"
   7 INPUT A$
   8 IF A$(1)="Y" THEN GOSUB 960
0
  10 LET A$="▀"
  11 LET N=0
  15 LET Z=0
  20 LET X=0
  30 LET Y=15
  40 PRINT AT 20,RND*28;"****"
  50 PRINT AT X,Y;
  60 IF PEEK (PEEK 16396+256*PEE
K 16399)=23 THEN GOTO 9000
  65 PRINT AT X,Y,A$
  70 LET Z=Z+1
  80 SCROLL
  90 IF INKEY$="H" THEN GOTO 920
0
 100 LET Y=Y-(INKEY$="5")+(INKEY
$="8")
 110 IF INKEY$="4" THEN LET Y=Y-
4
```

Turn to page 23

ZX SPECTRUM SOFTWARE

SUPERDRAW 16 £5.00

List of Features
- 16K Spectrum graphics pack
- Full screen high resolution colour
- Moving cursor control
- Large alphabet facility
- Pictures saved on cassette
- Automatic "slide show" option
- Menu driven, easy to operate, crash proofed
- Documented to usual high Video Software standard
- Demonstration slide show
- Audio commentary on reverse of cassette

SUPERVIEW 48 £5.00

List of Features
- 48K Spectrum personal viewdata
- Page creation with moving cursor
- Large alphabet option
- 48 full screen two colour pages *OR*
- 24 full screen full colour pages
- Random page recall
- Continuous page rotate
- Print option
- Full operating manual to our usual standard
- Audio commentary on reverse of cassette

VIDEO SOFTWARE LTD

Stone Lane Kinver, Stourbridge, West Midlands, DY7 6EQ

Prices include VAT, P&P immediate delivery.

Full range of ZX81 software still available.

DRAGON 32
NEW FROM

TROJAN

"SPACE TREK"

Space Trek is an absorbing space wars game in real time which can be played in any of four levels. Special features include: Onboard battle computer, long-range galaxy scanning, a galaxy containing 100 quadrants, impulse and warp drive speeds, shield control and status reports.

THE TROJAN LIGHT PEN

PLUGS INTO JOYSTICK PORT
SUPPLIED WITH CASSETTE OF INSTRUCTIONS
A SIMPLE-TO-USE DEVICE FOR MICRO FANS

REVERSI

THE CLASSICAL GAME WRITTEN IN HIGH RES WITH COLOUR AND SOUND. 4 LEVELS OF PLAY, SUITABLE FOR ALL AGES

Send to: **TROJAN PRODUCTS, Dept PCK**
166 DERLWYN, DUNVANT
SWANSEA, WEST GLAM SA2 7PF

Please send:
SPACE TREK ☐ I enclose cheque/PO for £7.50
LIGHT PEN ☐ I enclose cheque/PO for £10.00
REVERSI ☐ I enclose cheque PO for £5.50

All prices include post and packing

MR/MRS.....

ADDRESS.....

.....

THE DRAGON DUNGEON

TAKE INVENTORY

You've tried N, S, E and W, and failed to find the item you are after. Now is the time to "Take Inventory" at the Dragon Dungeon.

The Dungeon vaults are filled with peripherals, software, books and other goodies exclusively for the Dragon 32 owner —from cassette recorder leads to editor assembler — from arcade games to Database Management Systems.

Our stock of software is selective, rather than extensive, since we believe in value for money. Feed your Dragon on the best programs!

Best selling game Salamander's "Dragon Trek" £9.95.

Best selling book "The Working Dragon 32" £5.95. Now in stock "Dragon Companion" £4.95.

We now have the widest selection of Dragon Software available in the UK (games, education, business and utilities). Send for catalogue.

DRAGON STICKS!

Top quality double potentiometer joysticks for the Dragon owner who demands arcade action Ultra-sensitive, but tough and reliable, Dragon Sticks will keep on zapping when others fail! £19.95 per pair inclusive VAT and postage.

DRAGON OWNERS CLUB

The Dragon Dungeon Club monthly newsletter, Dragons Teeth, is packed with news, reviews and information for the dedicated Dragon-basher. We still need your tips, discoveries, reviews and "beefs" and will send out guidelines and payment rates to those of you who feel up to full-scale articles.

The March issue of *Dragon's Teeth*, due out late February, includes both hardware and software offers and Club Members registering before March 31 will be eligible to purchase Dragon badges and sweatshirt at very special prices.

Annual membership, including *Dragon's Teeth*, £6 (six-month trial subscription £3.25).

THE DRAGON DUNGEON

PO BOX 4, ASHBOURNE, DERBYSHIRE DE6 1AQ. TEL: ASHBOURNE 44626

From page 21

```
 120 IF INKEY$="9" THEN LET Y=Y+
4
 130 IF INKEY$="7" THEN GOTO 150
 135 IF INKEY$="P" THEN GOSUB 95
00
 140 GOTO 170
 150 LET Z=Z-1
 160 GOTO 130
 170 GOTO 40
9000 CLS
9010 IF Z>1 THEN PRINT "YOU TRAV
ELED ";Z;" LIGHT YEARS"
9011 IF Z=1 THEN PRINT "YOU TRAV
ELED BACKWARD ";-Z;" LIGHT YEARS
"
9012 IF Z=1 OR Z=-1 THEN PRINT "
YOU TRAVELED ";Z;" LIGHT YEAR"
9020 IF Z<=50 THEN PRINT "TAKE A
NOTHER DRIVING TEST"
9030 IF Z>50 AND Z<=100 THEN PRI
NT "NOT BAD BUT STILL A LEARNER"
9040 IF Z>100 AND Z<=500 THEN PR
INT "QUITE GOOD"
9050 IF Z>500 AND Z<=1000 THEN P
RINT "VERY GOOD"
9060 IF Z>1000 THEN PRINT "DO YO
U WANT   JOB"
9061 IF Z=HI THEN PRINT "YOU ARE
 FOUND TO THE HIGH SCORE PLEASE
INPUT YOUR NAME"
9062 IF Z>HI THEN INPUT V$
9070 IF Z>HI THEN PRINT "YOU HAV
E BEATEN THE HIGH SCORE  PLEASE
INPUT YOUR NAME"
9072 IF Z>HI THEN INPUT D$
9073 IF Z>HI THEN LET V$=""
9074 IF Z>HI THEN LET HI=Z
9075 PRINT D$,HI
9076 IF V$="" THEN GOTO 9079
9077 PRINT V$,HI
9079 PRINT ,,,"ANOTHER GAME"
9080 INPUT S$
9085 CLS
9090 IF S$(1)="Y" THEN GOTO 6
9100 LIST 9060
9110 PRINT AT 21,0;"
9120 STOP
9200 IF H=2 THEN GOTO 100
9205 CLS
9210 PRINT "HYPERSPACE"
9220 PAUSE 10
9230 LET H=H+1
9250 LET Z=Z-50
9300 GOTO 100
9500 LET G=G+1
9510 IF G>=5 THEN RETURN
9520 FOR L=1 TO 5
9530 PRINT AT L,Y;","
9540 NEXT L
9550 RETURN
9600 PRINT "
9610 PRINT "                SPACE"
9620 PRINT
9630 PRINT "YOU ARE A NAVIGATOR
ON THE"
9640 PRINT """SCOUT AIR SHIP"" F
OR HER"
9650 PRINT "      MAJESTIES ARMY"
9660 PRINT
9670 PRINT
9680 PRINT "YOUR CONTROLS ARE:-"
9690 PRINT
9700 PRINT ""4"" FAST LEFT"
9710 PRINT ""5"" SLOW LEFT"
9720 PRINT ""7"" SLOW UP"
9740 PRINT "  (AT SPEED OF ASDERO
IDS)"
9750 PRINT ""8"" SLOW RIGHT"
9760 PRINT ""9"" FAST RIGHT"
9770 PRINT ""P"" FIRE"
9780 PRINT ""H"" HYPERSPACE"
9790 PRINT "N/L TO START"
9800 IF INKEY$<>CHR$ 116 THEN GO
TO 9800
9805 CLS
9810 RETURN
9820 SAVE "SPACE DAR5"
9830 GOTO 5
```

Asteroids

by Stephen Erhardt

Merlin

on BBC Micro

Merlin for the BBC Model B Microcomputer is similar to the MB game Simon where the player repeats the tune that the computer sends out. In my game the player enters the number of notes that he/she is going to try to repeat. The player repeats the notes by pressing the appropriate cursor control key which corresponds to the squares on the screen. When the player presses a wrong key the computer sounds an angry note. When the player completes the sequence the computer plays a jolly tune. The program uses colour, sound envelopes and the *Vdu*19, X, X, 0, 0, 0 command to instantly light up the colours.

Program notes

80	Defines sound envelope
100	Switches off the cursor
150	Switches off all the colours used
170	Defines graphics window for move number
180	Allows cursor keys to be used
190	Switches off key repeat
210	Stores all the notes away
220	Routine to print which move you are on
330-360	Goodbye and end routine
PROCboard	Draws out the board
PROCbox	Draws lights invisibly
PROCplayermove	Takes in your turn
PROClight	Switches on light and sounds colour
PROCanger	Sounds an angry chord
PROCcomputermove	Plays the tune
PROCend	Tells you how many sequences you completed
PROCtitle	Writes 'Merlin' on the screen in giant letters
PROCinstructions	Tells you how to play 'Merlin'
PROCtune	Plays the jolly tune
PROCdone	Tells you that you have finished
PROCagain	Asks you if you want another game

```
>>L.10,600
  REM*************************
  REM*          MERLIN         *
  REM*           By            *
  REM*       James Morle       *
  REM*        03/01/83         *
  REM*************************
  ON ERROR GOTO 330
  ENVELOPE1,3,0,0,0,1,0,0,121,-10,0,-5,120,120
  MODE 7
  VDU23;8202;0;0;0;
  PROCtitle
  MODE 7:PROCinstructions
  MODE 2
  VDU23;8202;0;0;0;
  FOR colour=1 TO4:VDU19,colour,0,0,0,0:NEXT
  PROCboard
  VDU 24,600;540;740;616;
  *FX4,1
  *FX11,0
  DIMRX(64):0%=0:T%=0:Z%=0:end=FALSE
  FOR 8%=0 TO 63:RX(8%)=RND(4):NEXT 8%
  CLS:MOVE 610,590:VDU5:PRINT;T%+1;:VDU4
  PROCcomputermove
  8%=0:T%=T%+1
  FOR W%=0 TO T%-1
    PROCplayermove
    IF end=TRUE MODE1:PROCend:ELSE Z%=Z%+1:NEXT
  IFT%=M% THEN PROCtune:MODE1:PROCdone
  Z%=0
  PRINTTAB(3,0);"COMPUTER'S MOVE"
  NOW=TIME:REPEAT UNTIL TIME=NOW+100
  GOTO 220
    *FX4,0
    *FX12,0
  MODE 2:PRINTTAB(6,16);"Goodbye"
    END

************************************
  DEF PROCboard
  FOR I%=1 TO 4
    READ COL%,A%,B%,C%,D%
    PROCbox(COL%,A%,B%,C%,D%)
    NEXT I%:GCOL0,7
  MOVE 200,240:DRAW 1132,240:DRAW 1132,912
  DRAW 200,912:DRAW 200,240:MOVE 200,528
  DRAW 1132,528:MOVE 1132,624:DRAW 200,624
  MOVE 592,912:DRAW 592,240:MOVE 748,240
  DRAW 748,912
  DATA 1,224,896,576,640
  DATA 2,224,512,576,256
  DATA 3,764,896,1116,640
  DATA 4,764,512,1116,256
  ENDPROC
************************************
  DEF PROCbox(COL%,A%,B%,C%,D%)
  GCOL 0,COL%
  MOVE A%,B%:MOVE C%,B%
  PLOT 85,C%,D%
  MOVE A%,B%
  PLOT 85,A%,D%
>L.610,1200
  ENDPROC
************************************
  DEF PROCplayermove
  PRINTTAB(0,0);SPC(19);TAB(5,0);"YOUR MOVE"
  A=GET-487
  IF A=1 PROClight(1)
  IF A=4 PROClight(2)
  IF A=2 PROClight(3)
  IF A=3 PROClight(4)
  IF A<>RX(Z%) PROCanger
  ENDPROC
************************************
  DEF PROClight(COLOR%)
  VDU 19,COLOR%,COLOR%,0,0,0
  SOUND 1,1,COLOR%*25,3
  NOW=TIME:REPEAT UNTIL TIME=NOW+20
  FOR colour=1 TO 4:VDU19,colour,0,0,0,0:NEXT
  ENDPROC
************************************
  DEF PROCanger
  SOUND1,-15,25,30:SOUND2,-15,50,30:SOUND3,-15,75,30
  end=TRUE
  ENDPROC
************************************
  DEF PROCcomputermove
  FOR D%=0 TO T%
    IF RX(8%)=1 THEN PROClight(1)
    IF RX(8%)=2 THEN PROClight(3)
    IF RX(8%)=4 THEN PROClight(2)
    IF RX(8%)=3 THEN PROClight(4)
    8%=8%+1:IF A%=63 THEN ERROR
    FOR J=1 TO 300:NEXT
```

Turn to page 29

NEWSOFT PRODUCTS

16K SOFTWARE FOR SINCLAIR ZX81 AND SPECTRUM

3D SPECTRAL MAZE

Fast action. 3D maze. Superb plot and draw routines. Make this specially commissioned program one that you must see.
SPECTRUM ONLY

SECRET VALLEY

A complex role-playing adventure with great graphics and full sound effects!
ZX81 OR SPECTRUM

TIME BANDITS

Two programs for the price of one! Side A has five fast action games. Practice them now before running Side B or you will not survive long in this magical adventure.
"Perhaps the most original of the new graphic adventure games (Eric Deeson, Your Computer, November).
ZX81 OR SPECTRUM

THE GREAT WESTERN

Arcade Adventure in the Wild West. Shoot the Moose, hunt the gold or fight the Indians. You have to be fast to survive the journey.
ZX81 OR SPECTRUM

ROULETTE

The Original Microcomputer Roulette. The only program to allow all legal bets within 16K. Excellent graphics. Can be used to test any system!
ZX81 OR SPECTRUM

The Black Dwarfs Lair

An impossible chase through the underground tunnels of the Black Dwarfs Caverns. Virtually unbeatable. Try it if you dare.
SPECTRUM ONLY

Cassettes £4.95 each — £8.00 for any two
Please specify which version required — ZX81 or Spectrum

NEWSOFT PRODUCTS
12 WHITE BROOM ROAD, WARNERS END
HEMEL HEMPSTEAD, HERTS, HP1 3PU

SPECTRUM SOFTWARE

IQ TEST.....£5.75

How intelligent are you? 2 separate tests give an accurate assessment of your abilities

THE JOKER.....£5.75

Hundreds of rib tickling puns and jokes coupled with mind blowing graphics. Great for parties!!

Trade enquiries welcome: Orders despatched by return

PRICES INCLUDE POST & VAT. ALL PROGS 16 OR 48K.

Flowchart LTD

PHONE
(0933) 650073

DEPT 1
62 HIGH STREET
IRTHLINGBOROUGH
NORTHANTS NN9 5TN

Battle of Britain

By Microgame Simulations for the Spectrum

One day in summer, 1940. Reports are coming in of enemy bomber squadrons crossing the English coast, target unknown.

How are you to deploy the nine fighter squadrons under your command to intercept the incoming threat!

British and enemy squadron movements are plotted on a superb high resolution secreen map of south east England with communications signals presented both visually and in morse code.

Features variable difficulty levels, full control of squadron movements, randomly selected targets and bomber routes for each game, intelligence reports, refuelling etc.

A tense game of strategy for one player

48K Strategic Wargame

only £5.95 (inc. p&p)

MS

73 The Broadway, Grantchester, Cambridge CB3 9NQ

HILTON COMPUTER SERVICES LIMITED

The renowned PERSONAL BANKING SYSTEM is now available for
ZX81 ■ ZX SPECTRUM ■ DRAGON 32

Maintain permanent records and fully detailed statements of your finances including:
- ★ ALL cheque book transactions and bank receipts
- ★ ALL standing order payments
  AUTOMATICALLY PROCESSED (monthly, quarterly, six-monthly or annually AND for set number of payments)

In addition the ability to search, locate, delete or correct previous entries. List by category facility is included. Additional BANK RECONCILIATION module available to automatically match your Bank Statement to your PERSONAL BANKING SYSTEM account.

Full instructions included and GUARANTEED after sales maintenance provided.

PBS ZX81 £8.95 (16K) ■ ZX SPECTRUM £9.95 (48K)
■ DRAGON £9.95 (32K)
REC (for use with above) £5.00

ORDER (specifying for which machine) by POST from

Hilton Computer Services Limited
Dept (PCW)
14 Avalon Road, Orpington, Kent BR6 9AX.
OR at the POST OFFICE using TRANSCASH ACCOUNT 302 9557

★ YOUR PBS IS NEVER OUT OF DATE ★

DRAGON OWNERS

BARRELS OF FUN IN THE NEW

ANOTHER GREAT GAME FROM MICRODEAL – GUARANTEED TO KEEP YOU PLAYING FOR HOURS TRYING TO SAVE THE BEAUTY FROM THE BEAST. ROLLING BARRELS! KILLER FLAMES! LADDERS AND RAMPS TO NEGOTIATE IN THE BEST GAME EVER FOR THE DRAGON 32 HOME COMPUTER.

DONKEY KING

FROM TOM MIX

All Cassettes £8 each (including VAT & P&P)

AVAILABLE FROM DRAGON 32 DEALERS NATIONWIDE OR ORDER DIRECT FROM:

MICRODEAL

41 TRURO ROAD, ST. AUSTELL, CORNWALL PL25 5JE TEL 0726-68020

Send 1st Class Stamp for FREE Software Lists for Dragon and Tandy range of Computers.

AVAILABLE FROM SELECTED John Menzies STORES & Boots

THE INVASION HAS BEGUN

The assault on your senses has begun with a great choice of games that have been created to give you a real challenge!

Post coupon now to Imagine Software, Masons Buildings, Exchange Street East, Liverpool, Merseyside L2 3PN.

Please rush me copies of (tick box)

☐ Arcadia ☐ Schizoids (for any ZX Spectrum)

☐ Arcadia ☐ Wacky Waiters (for any Commodore VIC 20)

Please debit my Access/Barclaycard (delete as necessary)

Card Number

I enclose Cheque/PO for £

Name

Address

CVG3

SUPERFAST CREDIT CARD SALES LINE:
051 236 6849 (24hrs)

Any of these games for just

£5.50 EACH

including first class post, packing, VAT and an UNCONDITIONAL LIFETIME GUARANTEE

When you buy Imagine Software you buy it for life. If an Imagine Software product EVER fails to load first time simply return it to Imagine for an instant free replacement.

All orders despatched by first class post within 24 hours of receipt.

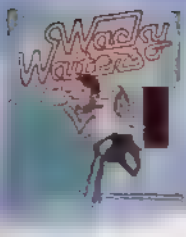
Why not put a first class stamp on your envelope and you will receive your order within 3 days of posting.

Available from good software outlets.

dealership enquiries contact: Mark Butler

Imagine Software, Masons Buildings, Exchange Street East, Liverpool, Merseyside L2 3PN.

..the name of the game



Imagine Software, Masons Buildings, Exchange Street East, Liverpool, Merseyside L2 3PN. Telephone: 051-236 0407

From page 23

```
1050  VDU 31,0,11,147,154,235,255,100,104,255,55,140,235,255,96,243,96,165,34
1060  VDU 255,55,96,107,125,32,107,255,33,32,32,34,255,53,32,107,255,116,32,107
1070  VDU 255,33,31,12,22,134,91,32,66,249,32,74,46,77,111,114,100,101,32,221
1080  VDU 31,0,12,147,154,106,255,32,32,255,53,32,106,255,96,47,32,48,32,255,55
1090  VDU 43,255,49,32,106,255,32,32,48,32,255,181,32,106,255,34,109,122,255
1100  VDU 32,31,0,13,147,154,96,96,33,34,96,96,32,96,96,96,96,96,33,34,96,96,32
1110  VDU 34,96,32,96,96,96,96,33,34,96,96,32,96,96,33,32,96,96,33,10
1120  PRINTTAB(0,20);CHR$147:PRINTTAB(0,3);CHR$147
1130  FOR L=1 TO 39:PRINTTAB(L,3);CHR$240:PRINTTAB(L,20);CHR$96:NEXT
1140  FOR YELL=16 TO 19:PRINTTAB(0,YELL);CHR$147;CHR$255;SPC(37);CHR$255:NEXT
1150  FOR YELL=4 TO 7:PRINTTAB(0,YELL);CHR$147;CHR$255;SPC(37);CHR$255:NEXT
1160  WAIT=INKEY(500)
1170  ENDPROC
1180 ****************************************
1190  DEF PROCinstructions
1200  FOR TITLE=1 TO 2:PRINTTAB(12,TITLE);CHR$(157);CHR$(129);CHR$(141);"MERLIN
   ";CHR$(156):NEXT

>L.1210,
 1210  PRINTTAB(0,5);"      This is a simple little
     game"
 1220  PRINT'"where the computer plays a series"
 1230  PRINT"of notes and you the player has to"
 1240  PRINT"match them up. As the game progresses"
 1250  PRINT"the computer builds up the tune to a"
 1260  PRINT"maximum of 64 notes."
 1270  PRINT'"      The notes are displayed as "
 1280  PRINT"coloured squares on the screen which"
 1290  PRINT"are arranged in a square which"
 1300  PRINT"correspond to the cursor keys."
 1310  WAIT=INKEY(1500):CLS
 1320  PRINTTAB(5,13);"How many notes will you
    try ? ";
 1330   PRINTTAB(12,16);SPC(40)TAB(12,16);"Enter 1
    to 64 ";:INPUT MX:IF MX<1 OR
MX>64 THEN 1320
 1340  ENDPROC
 1350 ****************************************
 1360  DEF PROCtune
 1370  RESTORE 1420
 1380  FOR TUNE=1 TO 12
 1390    READ pitchX,lengthX
 1400    SOUND &0001,-15,pitchX,lengthX
 1410    NEXT
 1420  DATA 129,5,101,5,117,5,129,5,149,5,137,5,
129,10,101,5,117,5,129,5,165,5,1
57,10
 1430  ENDPROC
 1440 ****************************************
 1450  DEF PROCdone
 1460  VDU19,0,4,0,0,0
 1470  PRINTTAB(12,10);"CONGRATULATIONS!"
 1480  PRINTTAB(2,16);"You have completed your
     sequence"
 1490  PRINTTAB(11,17);"of ";TX;" notes."
 1500  PROCagain
 1510  ENDPROC
 1520 ****************************************
 1530  DEF PROCagain
 1540  PRINTTAB(6,25);"Another Game (Y/N) ?";
 1550  A$=GET$:IF A$="Y" THEN CLEAR:GOTO 130
 1560   PRINTTAB(3,27);"Do you want to start a new
     game"
 1570   PRINTTAB(3,28);"or do you want to finish
     (S/F)? ";:ZX$=GET$
 1580   IF ZX$="S" CLEAR:RUN:ELSE GOTO 330
 1590  ENDPROC
 1600 ****************************************
```

Merlin
by James Morle

3-D Mountain

on Dragon

3-Dee Mountain is a short listing but the result is a graphic picture as seen on big computers.

It runs on either the TRS-80 Color Computer or the Dragon 32.

If your computer can handle it then *Poke* 65495,0 to speed up the plotting, but remember to slow it down with *Poke* 65494,0 before using printer or cassette.

Program notes

1-5 CREDITS
10 SETS THE SCREEN FOR USE
20-30 PSETING VALUES
40 PLOTS POINTS
50 FREEZE

```
1 '**********************************
2 '**     3-DEE  MOUNTAIN          **
3 '**          BY                  **
4 '**     JEREMY HUGHES            **
5 '**********************************
10 PMODE4,1:SCREEN1,1:PCLS:PCLEAR4
20 A0=STR$(RND(180)):Z=VAL(A0):Z=Z+69:W=
Z+24:D=(Z/2)-24:G=PI*(W/51-3):XX=128-((W+
D)/2):YY=179-(D):PI=3.1415926
30 FOR Y=8TO 0 STEP2:FORX=8TO W STEP3:P=
SIN(Y/D*2*PI-PI/2)+1:T=SIN(X/W*2*PI-PI/2
):H=P*T*G
40 H=F*(H):XA=X+Y+XX:YA=Y+YY:PSET(XA,YA
-H,1):NEXTX,Y
50 GOTO50
```

3-D Mountain
by Jeremy Hughes

Cruising Challenge

£10 to be won

Can you beat the new high score?

First there was *Space Invaders*, then there was *Pacman* — now there is *Cruising*. This all-action, machine code, arcade type game, will test your powers of co-ordination to the limit. Never before has a game asked you to think so quickly, or move so fast.

Achieving a high score on *Cruising* takes considerable skill, and not a little practice. Getting through the first four levels is not easy, and that's just the beginning.

Now you can make that skill work for you. *Popular Computing Weekly* is offering £10 each month to the player with the highest score on *Cruising*. All you have to do to enter this month's competition is send a print-out of your highest score, together with your name and address, to:

Popular Computing Weekly
Cruising Challenge
Hobhouse Court
19 Whitcomb Street
London WC2 7HF

Each month we will publish the name of the winner and the new *Cruising* high score. Are you good enough to accept the Cruising Challenge?

The highest score sent in so far this month is 3382 from *Stephen Salmon* of 8 Peterhouse Close, Mildenhall, Suffolk. If you have a higher score, you will win this month's £10 — but hurry, entries close on March 31.

Notes

1) Each entry must consist of a ZX printout and your name and address.
2) Closing date for this month's *Cruising Challenge* entries is March 31.
3) The highest score each month will receive £10.
4) High scores cannot be transferred from one month to another.
5) The judges' decision is final.
6) No employees of Sunshine Publications Ltd, or their families, will be eligible to enter the *Cruising Challenge*.
7) *Cruising for Broadway* for the 16K and 48K ZX Spectrum is available through W H Smith and leading computer stores for just £4.95. It is also available mail-order from: Sunshine Books Ltd, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.

FOR THE FIRST TIME ANYWHERE IN THE WORLD!

ACCURATE ASTROLOGY

ON YOUR 16K SINCLAIR ZX81 AND 48K SPECTRUM

NATAL CHART CALCULATIONS WITH ASPECTS, PROGRESSIONS AND TRANSITS ON JUST 1 CASSETTE

There is no question of planets being several degrees out or in the wrong sign! ASTROCALC programs give you an average error of less than ■ min ■ longitude for all planets (20th century).

FOR ONLY £25 we offer:

Natal longitudes, declinations, aspects with actual orbs, progressions for any year with mutual aspects, progressed to natal, and lunar aspects by month, and transits for from 1 to 12 months (outer planets, major aspects only. Mars just conjunction and opposition), or from 1 to 7 days all planets, major aspects.

With the 48K Spectrum you can also add any of the following modules.
£5 Harmonics with aspects, etc ■ !50 Town Gazetteer
■ Synastry (Direct chart comparison)
£5 Composite chart £3 Relationship chart
■ British Summertime correction routine
£10 Midpoints, including Solar Arc Directions, Transits to Midpoints, Lists of Midpoints, Orb and Dial changes

And we display the planetary signs and symbols on the screen instead of showing the two letters which have to be used on most machines

A still wider range of programs is available for the Commodore PET series, and Genie/Tandy TRS80 computers.

Please send cash with order, or sae for further details for Spectrum and Commodore machines to:
Terry Dwyer, 53 Loughborough Road, Quorn, Loughborough LE12 8DU or for Genie/Tandy/ZX81 and general enquiries to: Colin Miles, 67 Peascroft Road, Hemel Hempstead, Herts HP3 8ER

ASTROLOGY

truly AVAILABLE AT YOUR FINGERTIPS

USER PROMPTING PROGRAMS: merely key in birth information as requested by the computer — READ OUT (and/or PRINT OUT) what is normally the result of many hours of painstakingly tedious and complex mathematical calculations using tables, ephemera, etc.

THE SIDEREAL TIME OF BIRTH.
THE ASCENDANT AND MIDHEAVEN in Sign, Degrees, Minutes and Seconds for EQUAL HOUSE SYSTEM.
THE SIGNS AND POSITIONS OF THE HOUSE CUSPS in Sign, Degrees, and Minutes for the PLACIDEAN SYSTEM.
THE SUN AND MOON POSITIONS in Sign, Degrees, Minutes and Seconds.
ALL THE PLANETS' POSITIONS in Sign, Degrees and Minutes.
THE LUNAR NODE — THE PART OF FORTUNE — THE VERTEX AND A HOST OF OTHER BIRTHCHART INFORMATION AT THE TOUCH OF A KEY.

ZX81 16K

ZODIAC I ONLY **£10.00**
ZODIAC II ONLY **£8.00**
GIVES YOU THE ASPECTS AND MIDPOINTS

FOR 48K SPECTRUM AND DRAGON 32

ZODIAC F
Full combined program on one cassette

FOR ONLY **£15.00**

Other programs in course ■ preparation include: PROGRESSING THE HOROSCOPE; RECTIFICATION OF THE BIRTH TIME, etc.

Send orders with cheque payable to:

STELLAR SERVICES

8 FIR TREE VALE, LEEDS LS17 7EY
Tel: (0532) 692770

FORTH FOR THE DRAGON 32

'DRAGONFORTH' is an implementation ■ Fig-FORTH for the 'DRAGON 32' microcomputer but with a difference.

As well as the enormous power of the FORTH language, 'DRAGONFORTH' can also execute BASIC statements. This combines the superb DRAGON sound, graphics and Floating-Point commands with the tremendous speed of FORTH to produce an unparalleled hybrid. You can write a whole program in BASIC or a whole program in FORTH or any mixture of both.

If not already convinced send £2.50 for the 60-page manual (redeemable against first order).

'DRAGONFORTH' is professionally packaged, sensibly priced, guaranteed for life and will be despatched by return complete with free demonstration graphics program.

AUTHORS: Oasis Software will market high quality programs you write ■ 'DRAGONFORTH'. We pay a lump sum on acceptance and a generous royalty. Let's hear from you!
OASIS SOFTWARE, LOWER NORTH STREET, CHEDDAR, SOMERSET. Telephone 0934-515265.

£18·95
INC. P&P AND V.A.T.

DEALER ENQUIRIES WELCOME

ACCESS ORDERS TAKEN BY PHONE 24 HOURS A DAY

OASIS SOFTWARE

Journey to Middle Earth

Ah, Adventuring! The clang of your broadsword against Orcbone, the relief when a high-level spell works, the dread-filled wait while the dungeon door creaks open to reveal . . .

After the Space Zap games, Adventures must be the most popular programs for home computers. This week we are starting a regular look at the world of Computer Adventures. We will have reviews ■ new programs, as well as retrospectives of old favourites.

The main purpose of this column will, I hope, become the exchange of views, ideas and general comment from you, the readers, on Computer Adventuring. One of the advantages of this Forum will be the sharing of *Hints 'n' Tips*. How many times have you wished that someone would give you the smallest clue to enable you to get past a troll, or get out of that pesky maze? The computer, on your plea for *"Help"*, usually just says "You're on your own, buddy!".

So, if you are stuck at any point ■ an Adventure let us know. If we do not know the answer to your problem, we will ask other readers for their suggestions.

Finally, let us know of a favourite monster, treasure, or location that you have created for your own Adventure. We will publish the most interesting ones in this column. Later in the year, we hope ■ put together our own *Popular Computing Weekly Adventure*, containing as many ■ your ideas as possible.

The Hobbit

Can there be anyone who goes on Adventures, and has not read Tolkien's *The Hobbit*? I will always remember reading it for the first time, and the sense of loss when I had finished. *The Lord of the Rings* was, ■ course, ■ much vaster undertaking, both by author and reader, and, while it alleviated, somewhat, that sense of loss, it nevertheless had also lost that air of innocence, or naïvety that pervaded *The Hobbit*.

So, Melbourne House's *The Hobbit* (for 48K Spectrum), is very welcome, and is, I believe (tell me if I am wrong!), unique in at least one regard. Not only do you, as *Bilbo Baggins*, react with all the other characters (especially Thorin), but while you are off doing battle or hunting for the Smaug gold, all the other creatures ■ Middle Earth are getting on with their own lives. Thus, you may come back to a location, having left it in a certain state, and find a new situation developing. Nothing is certain in this Adventure, but uncertainty!

Add to this the brilliant graphics that are used to describe many of the locations (although not, surprisingly, Rivendell), and the almost novel-like running commentary from the computer (this will be *Printed* on command), and we have an Adventure that is going to become a classic for the Spectrum. As the program was originally developed for the TRS-80, we may expect to see it for other machines soon. The price of £15 puts it into the luxury bracket, but for this you get a large box, which contains cassette and 16-page instruction book. This, I am glad ■ say, includes a dictionary of permissable words (in combination, over 500), very welcome if, like me, you always get stuck on how to communicate with the computer! Last, but not least, a paperback copy of *The Hobbit* is also included in the package.

I hope to keep you up-to-date with my progress through Melbourne's Middle Earth; at the moment I have not gone too far — I am either stuck in the Lonelands or in the Goblins dungeon, trying to get out (and any small clue would be much appreciated!).

Next week, I will be looking at another Adventure. In the meantime, remember: *you are never alone with a Balrog!* ■

This is the first in a series of articles designed for novice and experienced Adventurers alike. Each week Tony Bridge will be looking at different Adventures and advising you on some of the problems and pitfalls you can expect to encounter. So, if you have an Adventure you want reviewed, or if you are stuck in an Adventure and cannot progress any further, write to Tony Bridge, Adventure Corner, *Popular Computing Weekly*, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.

Hobbit Competition

Who will be first to complete The Hobbit?

Anyone who has ever read *The Hobbit* will be familiar with Tolkien's world of Middle Earth. Elves, dwarfs, hobbits and men rub shoulders with wizards, trolls, orcs and dragons in a land of make-believe.

The Hobbit has recently been turned into a graphics adventure for the 48K Spectrum by Melbourne House (*Popular Computing Weekly*, December 30). In this adventure, you take on the character of Bilbo Baggins and attempt to find your way through to the Dragon's Lair and bring back his treasure. You are assisted, and sometimes hindered, ■ your quest by Thorin the dwarf and Gandalf the wizard.

Both the characters and the locations are taken from the original book, which provides many clues for the budding adventurer. Where *The Hobbit* differs from most other adventures, apart from the use of graphics, is in Artificial Intelligence. The other characters in the game have independent lives and are quite capable of acting on their own.

The end result ■ an adventure that is both enjoyable to play but extremely difficult ■ solve. So, *Popular Computing Weekly*, in conjunction with Melbourne House, is offering a star prize to the first person to complete *The Hobbit*.

■ you succeed in solving 100 percent of *The Hobbit*, you will find a short message appears on the screen. All you have to do to win this competition is send a copy of this message, together with your name and address, to:

Popular Computing Weekly
Hobbit Competition
Hobhouse Court
19 Whitcomb Street
London WC2 7HF

We would also like to discover who has progressed furthest in *The Hobbit* so far. Tony Bridge has completed 35 percent — if you have completed more ■ *The Hobbit*, please write in and let us know. We will publish the leading scores each month, until someone succeeds in solving 100 percent of the game.

Notes

1) Each entry must consist ■ two sentences, which you will discover at the end of *The Hobbit*, together with your name and address.
2) The first person ■ complete 100 percent of *The Hobbit* will win six books (*Understanding Your Spectrum, Spectrum Machine Language For The Absolute Beginner, Over The Spectrum, The Complete Spectrum Rom Disassembly, Spectrum Hardware Manual* and *The Working Spectrum*), and a copy of *Cruising on Broadway*, a fast action, m/c game.
3) The judges' decision is final.
4) No employees of Sunshine Publications Ltd, Melbourne House Publishers, Sinclair Research Ltd, and associated companies, or their families, will be eligible to enter *The Hobbit* Competition.

■ *The Hobbit* package — 48K Spectrum cassette, full colour instruction manual and *Hobbit* book (£14.95) — is available from Melbourne House Publishers, 131 Trafalgar Road, Greenwich, London SE10.

"AND WHERE THE DRAGON'S TEETH FELL ARMED MEN SPRANG UP"

Dave Town and Keith Nathan announce

SON OF DRAGON BYTE

LAST CHANCE

[illegible] ASH ROAD, HEADINGLEY
LEEDS 6
Tel: LEEDS 744235

A LOT MORE ROOM FOR A LOT MORE COMPUTER SOFTWARE, BOARD GAMES AND BOOKS

DRAGON 32 SOFTWARE

EDITOR ASSEMBLER + MONITOR
Assembler functions include ORG, FCB, FDB, FCC, EQU, RMB and Hex or Decimal addition subtraction. The ASSEMBLER is of the Two pass Global type. Monitor contains useful routines enabling the user to write and run machine code programs. Supplied on cassette + user manual £27.65

D.G.T.1
Contains five super games: OTHELLO, BREAKOUT, AWARI, MOONLANDER and RAFFLES
Fascinating entertainment for all the family
Only £5.95

D.G.T.4 M code
PTERODACTYL. Destroy all the Eggs before they hatch. Beat off the attacking PTERODACTYLS
TORPEDO RUN. Similar to the ARCADE version. 3D perspective. Ships further away give higher points
HORNETS. Very fast game. Kill the HORNETS as they emerge, but beware when angry they swoop down firing 'stings'. All three games only £6.95

DISASSEMBLER
The ideal tool to have around. Disassemble the BASIC to see how it works. Make use of subroutines, etc
Supplied on cassette £11.65

D.G.T.2
M/Code games **SNAKES.** Kill them before they kill you. Up to 12 giant snakes at one time
LANDER. Land your craft on the Lunar surface
INVADERS. [illegible] invaders, mother ship, 3 defenders, 9 skill levels. All three games in HI-RES + sound £6.95

CHESS M-Code
8 Selectable levels of play
Hi-Resolution display of board and pieces. Cursor control 'move' selection
Specifice pieces may be set up to solve chess problems
Supplied on cassette + instructions £7.95

ALL ORDERS INCLUSIVE. SAME DAY DESPATCH. SEND S.A.E. FOR LIST
J. MORRISON (MICROS), 2 GLENSDALE STREET, LEEDS LS9 9JJ
Callers welcome please phone (0532) 480987

DRAGON SHARP MZ 80K

NEW! NEW!

TEXT ON HIGH-RES GRAPHICS FOR DRAGON

A 2.5K sub routine that produces text of all sizes and colours in any mode of high-res graphics. Easy to use directly from the keyboard and allowing full use of inkey$ print at and numeric variables £7.95

WANTED URGENTLY

Dragon, Oric and Vynz programs. We pay excellent royalties or purchase the copyright for cash

Maths Tutor — A set of programs for teaching maths to children (3-10 yrs) £5.00

Games Packs: £5.50 each
(1) Bowling, UFO, Muncher, Microcopy, Mastermind. (2) Race-Chase, Depth Charge, Motor Cross, Glorious 12th, Canyon Bomber. (3) Tank Battle, Reaction Time, Blind Maze, One Man and His Dog Life

Adventure programmes:
Devils Triangle — Sail to Bermuda but avoid the Devils Triangle where anything can happen £5.00. **Earth Rescue** — Search the Universe for a rare mineral needed for Earth survival — space action £5.00. **Desert Patrol** — Cross the desert if you can! £4.00. **King of the Valley** — Try to rule a kingdom and its people £3.00. **Business** — Mailing List £15.00, Payroll £25.00, Stock Control £15.00, Home Finance £7.00, Tax Calculator £4.00. Many more programs available SAE for details

ABACUS — ABACUS SOFTWARE

SPECTRUM ** DRAGON ** ZX81 (16k)

New for 1983

VOCAB FRENCH and VOCAB GERMAN

A vocabulary of the useful 700 words, from word frequency lists, to put the needed words into your "memory"

State machine and FRENCH or GERMAN together with cheque for £5.00 to cover p&p, to . . .

BOND SYSTEMS

15 BELMONT ROAD, HARROGATE
NORTH YORKSHIRE HG2 0LR

CAN YOU RUN

the Gauntlet

ONLY £5.50 inc p&p

Now everyone has the chance to own this fantastic new piece of video action software. Available from Buffer Micro, Streatham, Microware, Leicester, Micro Marketing, Coventry Micro Centre, and by post from:

Colourmatic Computing,
40 Longfellow Road,
Coventry, CV2 5HB

"Highly Addictive" - Popular Computing Weekly
"Thrilling" - Computer and Video Games

16K
ZX-81

Micro General would like to give you a piece of their mind-free!

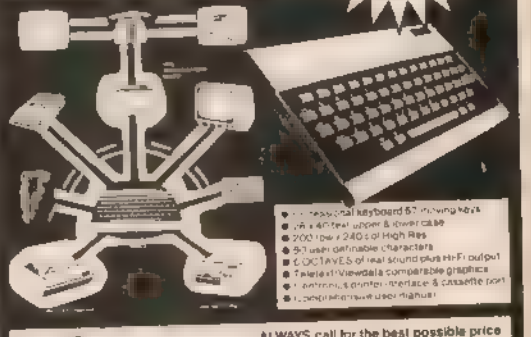
With the vast array of "cut price offers" or "special deals" buying a Micro computer is becoming a real headache. You can now buy a Micro computer off the shelf almost anywhere. It's when you get home that your troubles can start - which cassette, which printer should I buy? Can I connect up my Hi Fi to the Oric 1. - And so on.

We at Micro General do not just sell boxes off the shelf. As Computer Engineers (not pressure salesmen) let us tell you why the ORIC 1 is the right product at the right price.

BUY FROM US FOR PEACE OF MIND

ONLY £169.95 incl. VAT
Securicor del £5.98

THE ORIC 1
The real computer system



- [illegible] keyboard 57 moving keys
- 28 x 40 text upper & lower case
- 200 row x 240 col High Res
- 50 user definable characters
- COCTAVES of real sound plus Hi-Fi output
- Teletext/Viewdata comparable graphics
- Centronics printer interface & cassette port
- Comprehensive user manual

Micro General

ALWAYS call for the best possible price
Access Visa
(Dept PC31) 6 The Birchwoods, Tilehurst, Reading, RG3 5UH Tel 0734 25226

Quality Software from BRIDGE SOFTWARE

LYNCHMOB

for ZX81 with 16K RAM £4.95
for ZX Spectrum (16K) £5.50

Hangman was never like this! A competitive game of skill and strategy for 2 to 6 players. To make things fair, the computer picks turns. If you're the lucky one, you type in a word or phrase. Then the other players guess letters. And look out if they guess wrong, because then the lynching begins! Great fun! Educational too!

EPHEMERIS

for ZX81 with 16K RAM £6.90
for ZX Spectrum (16K/48K) £7.90

For everyone interested in astronomy. An observer's guide to the universe (1975-2000). Tell EPHEMERIS your position, the date and time EPHEMERIS will tell you the position of the sun, moon and planets in the sky above you plus a whole lot more astronomical information e.g. LST, phase, rise and set times etc. (rise and set times only in ZX81 and 48K Spectrum versions). Results may be printed out on ZX Printer. A triumph of programming skill!

All inclusive prices. Sent promptly by 1st class mail.
Full money-back guarantee. Send s.a.e. for further details.

Dept. Pop, BRIDGE SOFTWARE, 36 Fernwood,
Marple Bridge, STOCKPORT, Ches. SK6 5BE

Bridge Software

DRAGON BYTE
51a QUEEN STREET
MORLEY
Tel: 522690

Home Computers,
Software, Board Games
Mon—Sat 9 am—5 pm

STOCKISTS OF ZX81, SPECTRUM VIC AND ATARI COMPUTERS — AND OTHERS AS WE CAN GET THEM

SOFTWARE GAMES, EDUCATION ADVENTURES FOR VIC, ATARI ZX81, SPECTRUM ETC, ETC (OUR RANGE GROWS DAILY)

BOARD GAMES GALORE INCLUDING DUNGEONS AND DRAGONS

For more information and details of mail order, ring
KEITH NATHAN 788377
or DAVID TOWN 524543
after 7 pm

In MORLEY to Serve W. YORKS

SPECTRUM SOFTWARE

HOUSE OF HORROR 16K **£3.50**
ADVENTURE (Special Version) 48K
£4.50

Dare you enter this EVIL place? — many have but few have returned. Those who have are now quite *mad!!*

WIN £50 — for all those who can collect six hidden articles from the house and answer a simple question.

CHEQUE/PO + 50p P&P TO:
T. JEVON, 29 CROP COMMON, HATFIELD
HERTS AL10 0DG

DRAGON 32

Tired of searching for articles about your Dragon or Tandy Colour Computer? Feel all alone in a sea of Z80s and 6502s? Starved of information on Flex and OS-9, what can they do? Then you need:

COLOR COMPUTER NEWS

The monthly magazine for colour computer owners has arrived from the USA. It is packed with articles, program listings, reviews, tips and hints exclusively for Tandy and Dragon Computers.

Obtainable from Dealers giving real Dragon support or direct from:

39 The Terrace, Gravesend, Kent DA12 2BA.

Single copies	£2.45 including p&p
6 months subscription	£14.00 including p&p
12 months subscription	£24.00 including p&p

GRAVESEND HOME COMPUTERS LTD
For **DRAGONS** and **DRAGON** support
(0474) 50677

KAYDE HOME COMPUTERS LTD

Stockists of London's widest range of Home Computer Software, including Bug Byte, Quicksilva, Salamander, C. Tech, Silversoft, Imagine, Elfin, Rabbit, J. K. Grey, Romik — plus many other leading names.

Also in stock:

Oric 48K **£169.95**
Vic20 **£132.50**

Why not pay us a visit and compare our low discount prices or phone our same day dispatch mail order service.

OPEN 6 DAYS A WEEK

01-859 7505
1 STATION APPROACH,
NEW ELTHAM, LONDON SE9

ZX SPECTRUM & ZX81 EDUCATIONAL SOFTWARE

Spectrum Junior Education **£5.50**

Use your Spectrum to help your children with their school work. This cassette contains eight attractive, easy-to-use programs for the 7 to 11 age group.

Topics include English comprehension, spellings, homophones, junior science, maths and history.

- ★ Entering your own questions and answers allows you to adapt two of these programs for exercises in any subject area.
- ★ Moving colour graphics and sound are extensively used to improve motivation.
- ★ Use the "draw" program to produce pictures, maps and diagrams.

Suitable for the 16K or 48K Spectrum. Program notes are supplied.

O-Level Chemistry (C1) **£5.50**

This cassette contains four clearly presented revision-tutorial programs. The subject matter has been carefully structured to cover the most important aspects of:

- ★ Elements, compounds and mixtures.
- ★ Structure, bonding and properties.
- ★ Redox, electrolysis and the activity series.
- ★ Acids, bases and salts.

48K Spectrum and 16K ZX81 versions of the cassette are available. Please specify which you require.

Professional Computer Assisted Learning materials from:

CALPAC COMPUTER SOFTWARE
108 Hermitage Woods Crescent, St Johns,
Woking, Surrey GU21 1UF.

Overseas orders: £6.50 ($11.60) per cassette; includes AIRMAIL postage.

NEW SPECTRUM SOFTWARE

48K SPECTRUM

Super Spy

An exciting espionage adventure in which you follow the villain's trail through complex puzzles, coded messages and 3-D mazes. With different solutions every game Super Spy will keep you entertained for weeks! Full "save" routine **£6.50**

48K SPECTRUM

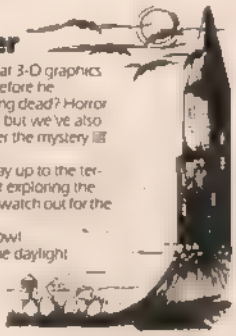
Everest Ascent

Stake your claim to the Top of the World in this gripping vertical adventure in which you aim to conquer the 29,141' summit of the world's highest peak.
Struggle from base camp to base camp in defiance of all the obstacles which man and nature can throw at you! Survive intense cold as you watch out for avalanches, thin ice and, of course, abominable snowmen! Cope with wayward Sherpas and cross bottomless crevasses but remember to watch your oxygen supply! A game of skill, cunning, bravery and daring for those with a head for heights! **£6.50.**

48K SPECTRUM

Transylvanian Tower

A spine-chilling adventure with spectacular 3-D graphics.
Can you rid the world of Count Dracula before he introduces you to the dark world of the living dead? Horror film addicts will know most of the moves, but we've also added a few of our own! Can you discover the mystery of the turret and escape with its treasures?
Enter via the dungeons and work your way up to the terrifying top! Find objects to help you whilst exploring the 500 rooms – all in exciting 3-D detail – but watch out for the bats.
Give your Spectrum a bite of the action now! Includes full save routine for use during the daylight hours! **£6.50**



Now available from selected branches of W.H. Smith & Son Ltd.

16K SPECTRUM

Ship of the Line

An Adventurous Management Game

Command a 17th Century sailing ship . . . win victories for Britain . . . juggle your supplies, manpower and ammunition . . . fearlessly battle your way up the ranks . . . and finally achieve promotion to First Sea Lord, but beware . . . it won't be easy! Encounter and engage enemy fleets . . . survive sunstroke, fever and famine . . . endure fire, fog and thirst . . . then when you think you've done well . . . rush back to Port for promotion! With full colour, ship graphics and sound . . . **£4.95**

For credit card orders please ring 0628 21107.

48K SPECTRUM

Ship of the Line

48K version features the chance to send out boarding parties, to build up prize money, to take intelligence tests and to bribe your way up the admiralty ladder! This greatly extended version of Ship of the Line really makes the most of your extra memory **£6.50**

16K ZX81

Bargain Bytes Cassette One

Deep Sea Adventure * Bank Account * Underground Adventure * Depthcharge * Hangman * Loan Calculator * Codebreaker * Foreign Currency Calculator. A genuine bargain!

Eight interesting programs for just **£5.00**

16K ZX81

Bargain Bytes Cassette Two

Stock Market Game * Seafaring Adventure * Jackpot * OXO * Financial Model * Ski Run * General Knowledge Quiz * Copycat

Too many programs to describe for only **£5.00**
Ideal as a ZX81 Starter Pack!

48K SPECTRUM

Multi Function Cash Controller

If you want to make your machine work for you, this is an ideal program . . .
Cash Controller has four basic functions; it keeps your Bank Account in order, it looks after your Home Budgeting, it calculates loan interest and repayments, and finally it checks your mortgage for you. In addition, it only lets you into the program by means of your own secret password which you personally choose. Once you've allocated budget headings, any transactions you put through the Bank Account will automatically be taken into account on your budgets.
Using a Sinclair printer, hard copy statements can be produced running from any date to any date, much more versatile than your regular bank statement! This program has been carefully crash-proofed to prevent a minor error from scrambling the existing data, and comes with clear on-screen instructions plus full printed notes to help you on your way. Finally, it holds up to 200 bank transactions and fills up most of the memory of your 48K Spectrum. **£10.00**

Despatch within 48 Hours Guaranteed.
All tapes despatched by First Class Post.

Richard Shepherd Software FREEPOST (No stamp required), Maidenhead, Berks SL6 5BY.

OFFER! Buy 2 get £1 off. Buy 3 get £2 off. Buy 4 get £3 off.

Please send me . . . 48K Spectrum . . . 48K Spectrum . . . 48K Spectrum . . . 48K Spectrum . . . 16K Spectrum . . . 16K ZX81

Super Spy £ 6.50
Transylvanian Tower £ 6.50
Everest Ascent £ 6.50
Ship of the Line £10.00
Cash Controller £ 4.95
Ship of the Line £ 5.00
Bargain Bytes One £ 5.00
Bargain Bytes Two

Discount for buying two or more?
Less £ . . .
TOTAL . . .

I enclose Cash/Cheque/Postal Order £ . . . payable to Richard Shepherd for . . .

Name . . .
Address . . .
Postcode . . .

Send your order immediately to Richard Shepherd Software, Freepost (no stamp required), Maidenhead, Berks. SL6 5BY

Degrees of freedom

***Calvin Woodings** presents a program for the BBC A and B to calculate Student's "T".*

When using measuring instruments, it is often necessary to decide whether or not the difference found between the averages of two small sets of data is due to a real difference between the sets, or due to some measurement inaccuracy. Earlier this century, W S Gosset — working under the pen name of Student — developed a theory to deal with such situations. The resulting significance test was thus called Student's 'T' test.

This program calculates Student's 'T' along with the averages and standard deviations of the data, displaying them all in a table. In addition, it calculates the right-tail value of the 'T' distribution curve for the data in question and uses this to tell you the reliability of the difference in averages. This saves the time taken in looking up confidence levels in tables of 'T'.

Four applications of the test are given: Option 1 allows you to compare the average of a set of results with any value which you choose. If you already know the real result, you can use it to check the accuracy of a new measuring device such as a weighing machine.

Option 2 enables you to compare two sets of data from the same population, eg. from two sets of measurements using the same instrument. In this case all the results are pooled to estimate the standard deviation of the instrument errors.

Option 3 is used when it would be incorrect to calculate the standard deviation from the combined data: for instance, if two different measuring instruments had been used, one for each set of data. Under these circumstances, a separate standard deviation is calculated for each instrument.

Option 4 is used when the data can be treated as pairs. For example, if you were trying to see whether there was a real difference between two weighing machines, you might weigh several different weights on each machine and then compare the difference between the results with zero. If the analysis showed that there was no significant difference between zero and the weight differences, you could conclude that the two machines weighed equally.

The final result is in the form: "You can be X% confident that the difference between the means is real." If X is greater than 90, there will be less than one chance in 10 of concluding that the difference is real when it had been caused by a measurement error.

The program is reasonably easy to understand, with the possible exception of the function at line 380. This routine calculates the right-tail value of the 'T' distribution using the following formula:

$$\tfrac{1}{2}(1 + a1x + a2x^2 + a3x^3 + a4x^4)^{-4} + e(x)$$

where $1e(x)1<2.5\times10^{-4}$

a1 = 0.196854
a2 = 0.115194
a3 = 0.000344
a4 = 0.019527

and where x is given by the following equation:

$$(t^{2/3}(1 - 2/8_d) - 2/9)(2/9 + t^{2/3}.2/8_d)^{-1/2}$$

The values of 't' and 'd' are calculated from your data and are Student's 'T' and the Degrees of Freedom respectively.

```
 10 REM STUDENTS t / SIGNIFICANCE TEST
 20 REM (C) C.R.WOODINGS
 30 REM VERSION 1.1 / FEB83
 40 REM RUNS ON BBC MODEL A OR B
 50
 60 MODE7
 70 FOR I=3 TO 4:PRINTTAB(13,I)CHR$141;"STUDENTS t."
 80 NEXT
 90 PRINTTAB(17,6)"Menu"
100 PRINTTAB(17,7)"~~~~"
110 PRINTTAB(2,9)"1. Compare data with expected mean value."
120 PRINTTAB(2,12)"2. Compare 2 means from same population."
130 PRINTTAB(2,15)"3. Compare 2 means from different popula
    tions."
140 PRINTTAB(2,18)"4. Paired results.Is difference real?"
150 INPUTTAB(4,23)"ENTER NUMBER OF TEST REQUIRED. "option
160 IF option<1 OR option>4 THEN 150
170 CLS
180 ON option GOTO 200,300,300,200
190
200 PRINTTAB(15,2)"OPTION "option
210 cols=1
220 IF option=4 PRINT'"     Enter the pairs separated by a
    minus sign. Th
    e computer will find the difference and compare it with
    whatever mean
    value you choose."
230 INPUT'" Enter mean for comparison. "mean2
240 PROCINPUT(cols)
250 PROCCOMPUTE(option)
260 MODE4
270 PROCDISPLAY(option)
280 END
290
300 PRINTTAB(15,2)"OPTION "option
310 cols=2
320 PROCINPUT(cols)
330 PROCCOMPUTE(option)
340 MODE4
350 PROCDISPLAY(option)
360 END
370
380 DEF FNchances
390 LOCALJ,K,L,R,S,T,X,Y,Z
400 X=1:Y=1:t=t^2
410 IF T<1 THEN 430
420 S=Y:R=dof:Z=T:GOTO440
430 S=dof:R=Y:Z=1/T
440 J=2/9/S
450 K=2/9/R
460 L=ABS((1-K)*Z^(1/3)-1+J)/SQR(K*Z^(2/3)+J)
470 IF R<4 THEN 510
480 X=.25/(1+L*(.196854+L*(.115194+L*(.000344+L*.019527))))^4
490 X=INT(X*10000+.5)/10000
500 GOTO530
510 L=L*(1+.08*L^4/R^3)
520 GOTO480
530 IF T>=1 THEN 550
540 X=1-X
550 X=INT(X*10000)/100
560 =X
570
```

Continued on page 37

ROMIK SOFTWARE

Church Street, Slough SL1 1PT. Telephone: Slough (STD 0753) 71535

SHARK ATTACK
For unexpanded Vic20

You are in shark-infested waters after being thrown overboard from a pirate ship. Your only protection being an atomic net which you trail behind you trying to cover all the visible ocean and enslave the sharks at the same time. Beware of stopping or covering your tracks for too long - if you do then the sharks will escape and come after you. Watch out for the ever increasing deadly octopuses (sometimes the sharks will eat part or all of one!)

MOONS OF JUPITER
For expanded Vic20, 3K, 8K or 16K

You are the Commander of a fleet of destroyers looking on from the safety of a mother ship, you send in one destroyer at a time to blast a passage through the **MOONS OF JUPITER. Your destroyers have to dodge, and blast the UFOs . . . . Watch out for the Golags** they can smash your destroyers, but you cannot harm them

A Machine Code
Arcade Quality Game
SEA INVASION
Unexpanded Vic20

Fight the attacking sea creatures for as long as you can. Shoot the whale for a surprise score, watch out for the crabs, starfish and octopuses

MARTIAN RAIDER
For unexpanded Vic20

Skim as close as you dare to the surface of the planet, devastating the Martian cities, destroying ammunition dumps (gaining more time), shooting down the ground-to-air missiles

SPECIAL OFFER . . . .
C4 COMPUTER CASSETTES
£2.50 for 10; £20 for 100

Available post free from the above address only

ROMIK PROMISE A MINIMUM OF ONE NEW GAME EVERY MONTH

MULTISOUND SYNTHESIZER
For the unexpanded Vic20

The Vic Multisound Synthesizer is very flexible and can be played in more ways than can ever be explained here. To create music and special effects. For example, create any tune, up to 255 notes (after following appropriate instructions) then press "F1" or "F3", then key "B" and enjoy the added effect. Now hit "+", listen to the difference. For a surprise — hit "-". Now add a melody over the top — hit key "B" then "7" — now play a melody, or experiment. Have fun!

MIND TWISTERS
For unexpanded Vic20
Four games to stretch your brain

Blackjack, Decipher, Four Thought and Tessa are our computerised versions of very popular home games and we'll test your mental agility and skill for many a long hour

SPACE ATTACK
For the unexpanded Vic20

Space Attack is a game of skill. You as the pilot of an intergalactic battleship have to fight your way through wave after wave of various alien spaceships

ALL PROGRAMS ARE £9.99

Machine Code Arcade Quality Game
STRATEGIC COMMAND
Our first game for the Dragon

A strategy game for two players. Will keep you active for many hours. Air, sea and land battles!

ALL PROGRAMS ARE £9.99

OUR GAMES ARE AVAILABLE FROM ALL GOOD HOME COMPUTER STORES

BBC DESKTOP CONSOLE

Tidy up your BBC Computer.

Television — Cassette Recorder — Single or Double Disc Drive

All accommodated on a professional console

This robust GRP Console also has provision for 10 cassettes and a foolscap notepad.

Size: 27½in (700mm) × 31½in (800mm)

A WORTHWHILE INVESTMENT at **£39.95**
INCLUSIVE OF P & P

Cheque or PO to:

LAMPLAS (DURHAM) LTD
7/9 RAMSAY STREET, HIGH SPEN
ROWLANDS GILL, TYNE & WEAR

DEALER ENQUIRIES INVITED
ZX AND ORIC CONSOLES AVAILABLE SHORTLY

The affordable FORTH

Forth: A full implementation of this very fast running language. Ideal for writing fast moving arcade type games. Allows the full colour and sound facilities of the Spectrum to be used. Future Microdrive enhancements will be made available. 48K Spectrum only. — 19.95

Chess 1.4: 10 levels m/c. Graphic screen display. 16K ZX81 only. — 8.95

Invaders: Very fast m/c action. Includes mystery ship and increasingly difficult screens. 16K ZX81 only. — 4.45

Mazeman: A fast action m/c game that reproduces the spirit of the original. The Spectrum version includes excellent graphics and sound. 16K ZX81 and 16.48K Spectrum. — ZX81 4.45 — 4.95

Adventure 1: Based on the original game by Crowther, this game was the start of the Adventure craze. Reviewed Sinclair User Iss.2. Features save game routine as the game can literally take months to complete. 16K ZX81 and 48K Spectrum. — ZX81 8.95 — 9.95

ABERSOFT
7 MAES AFALLEN, BOW ST, DYFED, SY24 5BA

Continued from page 35

```
580 DEFPROCINPUT(C)
590 DIMR(C-1)
600 C=C-1
610 IF option=4 THEN 630
620 FOR N=0 TO C:PRINT" Enter no. of items in sample ";N+1;"
    = ";:GOTO640
630 FOR N=0 TO C:PRINT" Enter no. of pairs ";
640 INPUTR(N)
650 NEXT
660 IF R(0)>=R(C) THEN R=R(0)-1 ELSE R=R(C)-1
670  DIM data(C,R),sum(C),sos(C),mean(C),var(C)
680  FOR N=0 TO C
690 IF option=4 THEN PRINT:GOTO710
700 PRINT" Enter results for sample ";N+1;" now:"
710 sum(N)=0:sos(N)=0
720  FOR M=0 TO R(N)-1
730 IFoption=4 PRINT" Pair ";M+1;" - ";:GOTO750
740 PRINT" Result ";M+1;" = ";
750 INPUTA$:data(N,M)=EVAL(A$)
760 sum(N)=sum(N)+data(N,M)
770 sos(N)=sos(N)+data(N,M)^2
780 NEXTM
790 mean(N)=sum(N)/R(N)
800 var(N)=(sos(N)-sum(N)^2/R(N))/(R(N)-1)
810 NEXTN
820 ENDPROC
830
840 DEFPROCCOMPUTE(O)
850 ON O GOTO 860,890,930,860
860 t=(mean(0)-mean2)*SQR(R(0)/var(0))
870 dof=R(0)-1
880 ENDPROC
890 t=(mean(0)-mean(1))/SQR(1/R(0)+1/R(1))
900 dof=R(0)+R(1)-2
910 t=t/SQR((1/R(0)-1)*var(0)+(R(1)-1)*var(1))/dof)
920 ENDPROC
930 t=(mean(0)-mean(1))/SQR(var(0)/R(0)+var(1)/R(1))
940 dof=(var(0)/R(0)+var(1)/R(1))^2
950 dof=dof/((var(0)/R(0))^2/(R(0)+1)+(var(1)/R(1))^2/
    (R(1)+1))-2
960 dof=INT(dof+.5)
970 ENDPROC
980
990 DEFPROCDISPLAY(O)
1000 CLS:PRINT" THE RESULTS ARE AS FOLLOWS:-"
1010 ON O GOTO 1020,1150,1150,1020
1020 PRINTTAB(9)"No.";TAB(16)"Sample 1"
1030 PRINTSTRING$(39,"=")
1040 FOR N=0 TO R
1050 PRINTN+1,data(0,N)
1060 NEXT
1070 PRINTSTRING$(39,"=")
1080 PRINT"TOTAL   =",sum(0)
1090 PRINT"AVERAGE =",INT(mean(0)*100)/100
1100 PRINT"STD.DEV.= ",INT(SQR(var(0))*100)/100
1110 PRINT'"Mean for comparison = ";mean2
1120 IF mean(0)=mean2 PRINT'"Means are equal.":ENDPROC
1130 PROCt
1140 ENDPROC
1150 PRINTTAB(9)"No.";TAB(16)"Sample 1";TAB(26);"Sample 2"
1160 PRINTSTRING$(39,"=")
1170 FOR N=0 TO R
1180 PRINTN+1,data(0,N),data(1,N)
1190 NEXT
1200 PRINTSTRING$(39,"=")
1210 PRINT"TOTAL   =",sum(0),sum(1)
1220 PRINT"AVERAGE =",INT(mean(0)*100)/100,INT(mean(1)*100)/
     100
1230 PRINT"STD.DEV.= ",INT(SQR(var(0))*100)/100,INT(SQR(var
     (1))*100)/100
1240 IFmean(0)=mean(1) PRINT'"The means are equal.":ENDPROC
1250 PROCt
1260 ENDPROC
1270
1280 DEFPROCt
1290 PRINT'"Students t = ";ABS(INT(t*100)/100)
1300 PRINT'"You can be ";100-FNchances;"% confident that the
     difference in means is real."
1310 ENDPROC
```

Spectrum
BBC
Atari
Dragon
Lynx
Oric
Colour Genie
Ace
Texas
Hardware
and Software
in stock

MID WALES Computer CENTRE

AberData at Galloways

27 Pier Street
Aberystwyth
Dyfed SY23 2LN
0970 615522

DRAGON 32 SOFTWARE

"NARNIA" — Can you stop Narnia and the invading aliens from destroying your cities? Fast all-action game with Hi-Res. Name & high score routine. £4.95

MAZE RUNNER — Absorbing 3-D Maze game with 3 play levels. Crack the control code before your air runs out. Fully random — different game every time. £7.95

DESIGNER — This amazing program will allow you to design your own characters and will actually write the program for the character you have created. You can then store it for future use. A must for the budding games designer. £7.95

ALL THREE TAPES £20

Send correct amount (P & P inc) or telephone 09295 51383, quoting your Access or Barclaycard No. for immediate despatch.

GAMES AND COMPUTERS
21 NORTH STREET WAREHAM TEL WAREHAM 51383

BUGBEAR

EASIREADER

THE GREATEST PROGRAMMING AID SINCE FINGERS. CUT DOWN PROGRAM ENTRY TIME. MINIMISE BUGS BY MINIMISING ENTRY ERRORS

Over 99% of bugs in programs copied from printout listings are the result of entry errors! The EASIREADER holds copy at a comfortable angle and a specially-designed cursor runs down the program to prevent slipping between complex and similar-looking lines.
It effectively keeps a finger on your current line — essential for use with SINCLAIR computers or when using the 'shift' key.
Available now only from BUGBEAR (Patent Pending No. 8232718) at an introductory price of £12.99 (plus £1.25 p&p). SAE for further details.

£££s TO BE WON WITH SUPER DRAGSTER
BBC MODEL B (32K MODEL A)

For 1 or 2 players.
Design your DRAGSTER and race it against a friend or the computer. Too heavy — it won't move! Too clumsy — it crashes!
Revving engines, crash noises, heckles and victory tune — superb sound and graphics.
BEWARE THE SUPER DRAGSTER! What is it? Beat the computer — if you can — and find out.
Great game with cash prizes. Competition details with each program. Previous knowledge of dragsters not required. A winner every month — it could be you. Only £5.95 inc p&p.

Cheque/PO to: BUGBEAR, Dept W, Nicholson Buildings, Templetown, South Shields, Tyne and Wear, NE33 5RZ.

30" × 16"
LAMINATE FINISH
3 POWER SWITCHES
SPACE FOR ADD-ONS
RAISED SURFACE

ZX81/SPECTRUM WORKSTATION

Professionally styled for accurate and comfortable operation. Computer and peripherals securely attached avoiding memory loss through jolts to system.

£19.95 inc. Computer cooling hatch

14 DAY UNCONDITIONAL MONEY BACK GUARANTEE

BAKER MF, UNIT 6, WOOLSBRIDGE INDUSTRIAL ESTATE, THREE CROSS DORSET B421 6SH

MONSTER SOFTWARE CLUB

SOFTWARE LIBRARY FOR THE DRAGON 32

TOP QUALITY CASSETTES FOR HIRE. ALL TAPES USED WITH THE MANUFACTURERS PERMISSION
(WE PAY ROYALTIES)

ANNUAL MEMBERSHIP FEE £8.00
Tape hire £1.50 per fortnight plus 50p [illegible] p
(this includes a pre-paid return envelope)

SPECIAL TRIAL OFFER
3 months membership for just £3.00

PLEASE NOTE: Two tapes may be hired at the same time
Further tapes by return post

SAE for details

MONSTER SOFTWARE CLUB
32 LENNOX DRIVE, LUPSET PARK
WAKEFIELD, WEST YORKS

DEATH'S HEAD HOLE

You'll almost believe it's true!

Courage, skill, and split-second decisions will see you through, as your newly-formed rescue team battles to save three frightened potholers, trapped in the blackness of Death's Head Hole.
There are hours of nail-biting excitement in this new brand of adventure for the Dragon 32 and BBC Model B, written with the help of cave rescue experts. After this, other adventures will just be games.

Only £5.45 by return of post from:

PEAKSOFT
7 Hawthorn Crescent, Burton-on-Trent

SPECTRUM 32K RAM £24.50

Upgrade your 16K Spectrum to 48K with our RAM kit. Only fits Issue 2 machines, identified by a large chip in a socket in line with the "9" key, visible through the rear expansion cutout. The kit consists of chips and instructions, and NO soldering is needed.

£24.50
Incl. VAT and P & P

HAPPY WITH YOUR DISPLAY?

Or have you got problems?
- Are your whites yellowish?
- Is every other line a different colour (like Venetian blinds)?
- Do your characters wobble? (Some character wobble is bound to exist, but it can be reduced)

We have prepared instructions to allow any Spectrum to give the best possible results, by adjusting internal controls.

Send £1 plus S.A.E. (Sent free if you order the RAM.)

FOUNTAIN COMPUTERS LTD,
Darvill Road, Ropley, Alresford, Hants SO24 0BW.

ZX SPECTRUM SOFTWARE CASSETTES
Patience (reviewed in this issue of PCW) **£5.95**
Fruit machine (reviewed in this issue of PCW) **£4.95**
Mancala **£5.95**, Solitaire **£4.95**, Repulser **£4.95**

JUPITER ACE MICROCOMPUTER £69.95
ACE I/O PORT KIT **£14.95** BUILT **£19.95**
SPECIAL OFFER **£5.00** OFF I/O PORT if ordered with ACE

ZX81 HARDWARE — NEW ILLUSTRATED CATALOGUE AVAILABLE (send SAE)
ZX REPEATING KEY MODULE KIT **£3.95** BUILT **£5.95**
ZX81 INVERSE VIDEO MODULE KIT **£2.95** BUILT **£4.95**
Also Keyboard, Beeper, Memory, I/O Port, Programmable Character Generator

SOFTWARE/HARDWARE DESIGNS WANTED FOR ANY COMPUTER

FED UP WITH YOUR ZX SOFTWARE CASSETTES?
We will pay £2.00 for any ARTIC, BUG-BYTE, QUICKSILVA original software cassettes including instructions.
We are also interested in buying second-hand hardware and computers, eg, ZX81, Spectrum, Vic20, ACE, Dragon, Oric

HAVEN HARDWARE
4 Asby Road, Asby
Workington, Cumbria CA14 4RR
094-686 627

Designer

This is an extract from ***Designer,*** *one of the programs in the chapter on graphics in* The Working Spectrum, *a book by* David Lawrence, *published by* ***Sunshine Books Ltd,*** *Hobhouse Court, 19 Whitcomb Street, London WC2 7HF: £5.95, 228pp.*

3.5 Designer

I have a special fondness for this program because the ideas on which it is based were not my own: they were taken from an excellent book, "The Principles of Interactive Computer Graphics" by William M Newman and Robert F Sproull. The reason I say fondness is that the program serves as a reminder to me of how much there is always to learn about the principles of programming and how many fields lie waiting to be opened up for no more cost than the price of a few books.

Based on two simple procedures taken from the book, this program allows you to define a design of up to 65536*65536 pixels across, to add and to delete, to examine the design at various scales and to rotate all or part of it on the screen. Once its use is mastered it is capable of being used in a variety of applications where it is desirable to be able to change and manipulate designs quickly and easily.

Module 3.5.1
This is a standard menu module.

Module 3.5.2
The functions and variables defined here will be discussed during the course of the commentary on the program.

Module 3.5.3
The function of this module is to take two sets of co-ordinates, X1/Y1 and X2/Y2, and to decide whether any part of a line drawn between the two points so defined will pass across the screen. If any part of the line does fall on the screen, it is drawn, other parts of the line are rejected.

Commentary
Line 1310. The screen forms a window on the overall design being created and the borders of the area to which the screen points are stored in the variables TOP, BOTTOM, LEFT and RIGHT. If BOTTOM is set to 500 and LEFT to 500, the screen will set to display any pixels which fall between 500 and 755 horizontally and 500 and 667 vertically. The purpose of this program line is to disqualify from consideration any line in the design which both starts and finishes above, below or to one side of the area of the design covered by the screen.

Lines 1320-1330. If a line starts above or below the area covered by the screen, these two lines reset the variable EDGE to coincide with the top or bottom of the screen.

Line 1340. For lines which begin above or below the screen, this line calculates the horizontal position at which the line will pass the top or bottom edge. The formula in the first half of the line says nothing more complex than that if, for instance, the line in question passes through the top edge of the screen halfway through its vertical component, it will also be halfway through its horizontal component. Clearly this will only hold true for straight lines.

Lines 1350-1430. The same procedure is carried out in relation to the co-ordinates Y1, X2 and Y2.

Line 1440. Since it is possible for a line not to lie entirely above, below or to one side of the screen and still not cross the screen itself, this program line checks that the co-ordinates calculated do in fact lie on the screen. If they do, then the first set of co-ordinates is plotted and a line is drawn to the second. ■

Module 3.5.1

```
1000 REM ************************
1010 REM MENU
1020 REM ************************
1030 IF U$="" PAPER 7: CLS : PRINT
 PAPER 0; INK 7; AT 1,10;"DESIGNE
R"
1040 PRINT '"COMMANDS AVAILABLE"
'
1050 PRINT "     1 INITIALISE DI
SPLAY"
1060 PRINT "     2 ADD NEW LINES"
1070 PRINT "     3 CHANGE POINTS"
1080 PRINT "     4 DELETE LINES"
1090 PRINT "     5 STOP"
1100 INPUT Z$: CLS
1110 IF Z$="1" THEN GO SUB 1190
1120 IF Z$="2" THEN GO SUB 1530
1130 IF Z$="3" THEN LET SEARCH=2
   GO SUB 1720
1140 IF Z$="4" THEN LET DENSITY=1
   GO SUB 1720
1150 IF Z$="5" THEN GO TO 1160
1160 CLS : GO TO 1090
1170 INPUT "DO YOU WISH TO SAVE
THIS DESIGN";U$: IF U$="Y" THE
N SAVE "DESIGNER": PRINT "REWIND
 THEN ANY KEY TO VERIFY": PAUSE
0: VERIFY "DESIGNER": PRINT "VER
IFIED"
1180 STOP
```

Module 3.5.2

```
1190 REM ************************
1200 REM INITIALISE
1210 REM ************************
1220 LET LEFT=0: LET BOTTOM=0: L
ET TOP=167: LET RIGHT=255
1230 LET A$=""
1240 DEF FN A$(X,Y)=A$(256*CODE
 A$(Y+1)+CODE A$(Y+1))
1250 DEF FN B$(X,Y)=CHR$ INT (X/2
56)+CHR$ (X-256*INT (X/256))+CHR
$ INT (Y/256)+CHR$ (Y-256*INT (Y/
256))
1260 DEF FN E$(X,Y)=CHR$ INT (X/2
56)+CHR$ (X-256*INT (X/256))+CHR
$ INT (Y/256)+CHR$ (Y-256*INT (Y/
256))
1270 LET A$="": RETURN
```

Module 3.5.3

```
1280 REM ************************
1290 REM CHECK
1300 REM ************************
1310 IF (X1<LEFT AND X2<LEFT) OR
 (X1>RIGHT AND X2>RIGHT) OR (Y1>
TOP AND Y2>TOP) OR (Y1<BOTTOM AN
D Y2<BOTTOM) THEN LET Z$="": RET
URN
1320 IF Y1>TOP THEN LET EDGE=TOP
1330 IF Y1<BOTTOM THEN LET EDGE=
BOTTOM
1340 IF Y1<BOTTOM OR Y1>TOP THEN
 LET X1=X1+(X2-X1)*(EDGE-Y1)/(Y2
-Y1): LET Y1=EDGE
1350 IF X2>TOP THEN LET EDGE=TOP
1360 IF X2<BOTTOM THEN LET EDGE=
BOTTOM
1370 IF X2>BOTTOM OR X2<TOP THEN
 LET Y2=Y2+(X2-X2)*(EDGE-Y2)/(X1
-X2): LET X2=EDGE
1380 IF X1>RIGHT THEN LET EDGE=R
IGHT
1390 IF X1<LEFT THEN LET EDGE=LE
FT
1400 IF Y1<LEFT OR Y1>RIGHT THEN
 LET Y1=Y1+(X2-X1)*(EDGE-X1)/(Y2
-X1): LET X1=EDGE
1410 IF X2>RIGHT THEN LET EDGE=R
IGHT
1420 IF X2<LEFT THEN LET EDGE=LE
FT
1430 IF Y2<LEFT OR Y2>RIGHT THEN
 LET Y2=Y2+(Y2-Y2)*(EDGE-X2)/(Y2
-X2): LET X2=EDGE
1440 IF X1<LEFT AND X2<LEFT OR Y
1<LEFT AND Y2<LEFT OR X1>255 AND
 X2>255 AND Y1<BOTTOM OR Y1>167
 AND Y2<BOTTOM OR X1>255 AND Y2<
BOTTOM OR X1<0 AND X2<0 AND Y1>1
67 AND Y2>167 THEN PLOT INT (X1-
LEFT),Y1-BOTTOM: DRAW INT (X2-X1
),Y2-Y1
1450 RETURN
```

FOX

PRODUCTS FOR THE ZX81 SPECTRUM, VIC20 AND JUPITER ACE

① VIC20

The VIXEN RAM CARTRIDGE for the *Vic20*. Switchable between 16K or 8K and 3K. Gives you the option of full 16K RAM or 8K and 3K RAM in one package. When added to the standard Vic gives 16384 bytes of extra memory in blocks 1 and 2 or 3092 bytes of extra memory into the 3K memory block AND 8192 bytes switchable between memory blocks 1 and 3. Simply plugs into the rear expansion port and fully compatible with all motherboards and modules available. No re-addressing of existing BASIC programs needed. **£39.95** inc P&P

NEW

② ZX81/SPECTRUM

We stock the keyboard below for both *Spectrum* and *ZX81*. A 42-key full travel, cased keyboard which your ZX81 fits inside. No soldering required. **£29.95** + £2.00 P&P

Please state for which machine.

ZX81

The unique ZX-PANDA, the professionally produced 16K RAM PACK that is expandable to 32K simply by plugging in our expansion modules. Start with 16K — expand later to 32K* Sol-Ely built attractively cased to fit perfectly on to ZX81 without wobble. Includes LED power indicator. The RAM PACK that won't become redundant when you want more than 16K

③ 16K expandable RAM **£24.50** inc P&P

④ 16K expansion module **£20.00** inc P&P

⑤ or full 32K **£40.00** inc P&P

⑥ ZX81

Another replacement keyboard — this one with a calculator-type feel. Peel off backing and press to fit. Incredibly low price of **£10.00** inc P&P

ALL ITEMS GUARANTEED

Overseas customers please add £2.00 to above prices to cover postage. Send sae for full catalogue.

Please send me

ITEM No

QTY

I enclose £ . . . . . .

SEND NOW TO:
FOX ELECTRONICS
141 ABBEY ROAD
POPLEY 4
BASINGSTOKE
HANTS. Tel: 20671

VIC20

SOFTWARE LIBRARY

Hire your VIC20 Programs from only 50 pence plus p&p.

Huge selection of software to choose from, plus two offices to handle your orders.

All material hired with full permission from Manufacturer.

A personal service for your personal computer, from Les and Des at Sovereign.

Send **£9.50** (cheque or postal order) for membership, program list, first order form and a chance to win an 8K expansion for your VIC!

SOVEREIGN SOFTWARE LIBRARY

101 Somersall Street
Mansfield
Notts

48 Rannoch Drive
Mansfield
Notts

SPECTRUM OWNERS!

SOFTWARE FOR A 16K OR 48K ZX-SPECTRUM

3D MAZE OF GOLD **£5.95**

Uses machine code to provide fast, full-colour 3D perspective views as you scour the labyrinth for GOLD. Looks lively and find the exit or your gold may well be worthless! Ten levels of play, all great fun. This is our most popular program.

GAMES TAPE 1 ..... **£4.95**

MONGOOSE

Fast moving action, in colour as you try to save your snake from the voracious mongoose. Don't dare pause! Your snake grows by eating the lethal apples in the orchard. Faster and harder on every frame. Superb graphics.

BEAR ISLAND

Trapped on the Arctic can you survive when each ice floe has even more bears than the last? A fast arcade style strategy game. Making full use of all the Spectrum features it is highly exciting and much acclaimed by all.

GAMES TAPE 2 ..... **£4.95**

REVERSI

This game provides a chance to pit your strategic abilities against those of the computer or another player. The version provides machine code thinking speed and plays a good game. Includes audible and visual indication of moves made.

POKER DICE

Gamblers beware! The use of hi-res graphics colour and sound together with a clever hand recognition system, makes this an addictive gambling game. You could win a fortune, you might lose your shirt, but roll, roll, roll those dice.

GAMES TAPE 3 ..... **£4.95**

TIME-LINE

A feat on the 16K machine as it provides a full textual type adventure with a maze. Written in 100% m c for speed. You must find your time machine to return to the present. Beware the gas!

TASKS

A new concept in graphical adventures. Collect all the treasure from within the maze by solving all the problems set by the TASKMASTER. All the tasks given will stimulate your mind.

WHITE NOISE AND GRAPHICS **£5.95**

Designed to overcome the limitations of Spectrum BASIC, WNG gives you over 20 extra commands to give explosion sound effects, total screen control using a window which can be scrolled in any direction, cleared, inverted, shaded and bordered. Uses BASIC variables (no POKEs needed) and named USR calls. Includes extensive manual.

CESIL **5.95**

A low cost, full implementation of this popular 'D' level teaching language, invaluable to students and teachers alike. Includes a comprehensive manual, tape load and save, editing, etc. It is available for the SPECTRUM, 16K ZX81 and now for the DRAGON 32.

GILSOFT

30 Hawthorn Road, Barry, South Glamorgan CF6 8LE

SAE for full details of these and other items.

RETAILERS INCLUDE — CARDIFF: Microcentre, Randall Cox. BARRY: Bytewell. YORK: Garnett Computer Services. BRIGHTON: Gamer. MORLEY: Dragonbyte. IVYBRIDGE: Ivysoft. PORT TALBOT: Jay Dee Communications. Also by mail from The Software Supermarket, LONDON.

DEALER ENQUIRIES ARE WELCOME. GENEROUS TRADE DISCOUNTS ARE AVAILABLE.

GAMES CENTRE

THE LARGEST SELECTION OF GAMES IN THE WORLD

We stock the **BIG NAMES** in Computers including

ATARI 400/800
SINCLAIR ZX 81
ZX SPECTRUM
VIC-64
DRAGON MICRO

and a wide range of independent

SOFTWARE

Main Computer Branches:
22 OXFORD STREET, London W.1.
439 OXFORD STREET, London W.1.
52 WESTERN ROAD, BRIGHTON.

Also at:
184 REGENT STREET, London W.1.
254 REGENT STREET, London W.1.

DON'T MISS THIS INCREDIBLE OFFER!

50 GAMES

£9·95

YES, 50 GAMES! on cassette for all the following:

FOR YOUR MICRO

sinclair SPECTRUM
ZX81 LYNX
DRAGON
ATARI VIC-20
apple
ACORN ATOM
BBC A/B
SHARP
ORIC-1
NEW BRAIN

CASCADE SOFTWARE
CASCADE'S HOUSE
BARGAIN'S LANE
LLANDOGO
GWENT
S.WALES
NP64PA

SUPPLY CASSETTE 50 FOR _____ COMPUTER

I enclose cheque/P.O. OR please debit my:

Access Barclaycard No. _____

Name _____

Address _____

ORDER NOW!

FOX

ONLY £24.00 — ELECTRONICS presents — ONLY £24.00

THE CHEAPEST AVAILABLE

SPECTRUM UPGRADE KIT

ONLY £24.00 — ONLY £24.00

ISSUE 2 MACHINES ONLY
DARK GREY KEYS

Takes your machine to 48K. No soldering required.
Full instructions supplied. Price fully inclusive

Send now to:

Please send me .....Upgrade Kits
I enclose £.....

FOX ELECTRONICS
141 ABBEY ROAD
POPLEY 4
BASINGSTOKE
HANTS. Tel: 20671

Introducing -

CP SOFTWARE

SUPER CHESS II

For Sinclair 48K SPECTRUM

THE BEST at £7.95

Specialists in high quality, intelligent games

Spectrum software

CP SOFTWARE

Proof of the superiority of SUPERCHESS II is available in the form of listings of 10 consecutive games played against Artic Spectrum Chess with the results SUPERCHESS II 8 wins, Artic Spectrum Chess 1 win and 1 draw. The listings are free with each program or 40p on their own.

Guaranteed able to beat Sargon II and all other Spectrum chess programs!!!

- ★ Seven levels of play
- ★ Plays a variety of openings e.g. French Defence, Sicilian Defence, Ruy Lopez, Queen's Gambit etc. ★ Self play mode ★ Analyse mode
- ★ Enhanced end-game play ★ Recommended move option

Available only from the address below — dealer enquiries welcome

●● ORIGINAL SUPERCHESS ●● The Cheapest
10 levels of play recommended move option: substantial opening book e.g. French Defence, Queen's Gambit, Ruy Lopez etc. self play feature:
48K Spectrum — £4.95
16K ZX81 — £4.95
analyse mode.

●● ZX DRAUGHTS ●●
The game for everyone, played at level 0 it replies immediately, can you beat it at level 9?
Draughts is an ideal game to apply tree searching techniques ■. Our machine code program analyses each position in depth making it a formidable opponent. Choice of colour and search strategy 10 levels of play, at level 4 (response time — 20 seconds) it beats its own programmer!
48K Spectrum — £6.95

●● BACKGAMMON ●●
Play this fascinating game of skill and chance
High resolution colour display with dice roll. Uses machine code for fast response. Plays official rules so no cheating. Complete with instructions ■ enable beginners to learn the game.
48K Spectrum — £5.95

●● SPECTRUM SPEECH ●●
Yes it's possible! Software driven speech from the Spectrum. Simple ■ use in your own programs. Each cassette comes with user documentation and demonstration program. No extra hardware ■ required. Uses Spectrum speaker and top 32K Ram
SOFTALK I: "Multiwords" 70+ words, numbers zero to million, plus, go, limit, right, great etc. . . 48K Spectrum — £6.95
SOFTALK II: 'Spacegames' 80+ words, numbers, red alert, torpedoes, phasers, bearing south etc. . 48K Spectrum — £6.95

SPECTRUM AMPLIFIER
Boost your Spectrum's speaker. This neat amplifier, with volume control, plugs directly into the Spectrum's EAR or MIC socket using the tape lead NO OTHER CONNECTIONS NECESSARY. Powered by a PP3 battery (not supplied), it doubles as a radio when not used with your Spectrum. £5.95 or only £4.95 when purchased with a SOFTALK program. Please add 35p to cover p+p.

Visit us on stand 56 at the Midland Computer Fair, BIRMINGHAM, April 28th to 30th.

UK prices include post and packing. Despatch within 48 hours of receipt of order.
(For orders outside UK add 80p for postage)

Send cheque or postal order to:
CP SOFTWARE, Dept. W17 Orchard Lane, Prestwood, Bucks. HP16 0NN

PROGRAMMERS — TOP RATES PAID FOR HIGH QUALITY SPECTRUM STRATEGY GAMES AND SPECTRUM FORTH. SEND YOUR MATERIAL FOR EVALUATION AND PROMPT REPLY.

CLASSIFIED

Semi-display — £5 per single cc
Trade lineage — 20p per word
Private lineage — 10p per word

BEST OF POPULAR Computing WEEKLY

Four top games on one cassette for £4.45.
Lasershaze and Kong's Revenge for the 16K ZX Spectrum
Robot Control (16K) and Alien Attack (1K) for the ZX81

Order now from **Popular Computing Weekly, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.**

We can normally deliver in four to five days.

BIBI MAGNETICS LTD

THE EXPANDING SOFTWARE DUPLICATING COMPANY

HAS A VACANCY FOR

An enthusiastic person who is fascinated by Microcomputers and is a tidy worker to help in our duplication and quality control department where we are producing cassettes for leading software companies.

If you have experience, quality or just rearing Nigel Boyle on 01-223 6655

BIBI MAGNETICS LTD
101-109 Plough Road, London, SW11

EASIREADER

The Greatest Programming Aid Since Fingers

Cut down program entry time
Minimise Bugs by Minimising Entry Errors

The EASIREADER is an attractive high-quality acrylic plastic stand designed to aid the manual entry of programs from magazine listings, paperbacks and most books.

99 percent of bugs in programs copied from printout listings are the result of entry errors.

The EASIREADER holds the copy at a comfortable angle, avoiding strain, and a specially-designed cursor runs down the program to prevent slipping between compare and similar-looking lines.

It effectively keeps a finger on your current line, especially useful for two-handed keyboard entries, and for use with Sinclair computers.

Available now only from BUGBEAR (Patent Pending No. 82327181) at an introductory price of £12.99 (plus £1.25 p&p)

Send cheque/PO or SAE for further details to: BUGBEAR, Dept. W, Nicholson Buildings, Templetown, South Shields, Tyne and Wear, NE33 5RZ.

PROGRAMMERS

Permanent or contract with sound micro and machine code experience. Competitive rates

Apply to
ASK, London House
42 Upper Richmond Road West
London SW14 8DD. Tel: 01-878 9182

ZX SPECTRUM 16/48K: A clever character designer plus six high class games including Pac-Monster, Galaxians, Grandprix, Catacombs, £3 inclusive. Send to Crownhouse, Ford, Argyll, Scotland.

VIC20, brand new, 12 month guarantee, super expander cartridge, Vic program guide, joystick, cassette and various magazines, £150. Tel: [redacted] Johnson 083-483 677 (after 4.30 pm).

VIC20 OWNERS please note Commodore 3K Ram pack sale, superb value at £25. Send cheque or PO now, offer ends soon.

PALACE SOFTWARE

GAMES PROGRAMMERS

Palace software, part of a leading film and video company, is looking for games for Atari 400-800, BBC Model B, TI99 4A, Spectrum, VIC 20 and CBM 64 for distribution in the UK, Europe and USA. High royalties will be paid for top quality and highly original material. Send samples to Pete Stone, Palace Software, 62-64 Kensington High Street, London W8 4PE. Tel: 01 937 6258.

WANTED — USED ZX81's
WORKING OR NOT

Slot under guarantee	£25
Working & good condition	£20
Not working	£10
Working 16K RAM pack	£10

Cheque by return of post

Telford Electronics & Computing
25a Bradford Street
Shifnal, Shropshire

COMMODORE 64 £264 + VAT
VIC20 £113 + VAT
Programmes plus accessories available.
SAE for details

ENFIELD COMMUNICATIONS
135 HIGH STREET
PONDERS END
ENFIELD, MIDDLESEX. Tel: 8057434

BBC SOFTWARE

For 32K 'A' and 'B' machines

Beebwit — High resolution adventure game
Beeb — Colourful music program to enjoy
Space Academy — Work your way up the ranks
Driving Test — Do you know the Highway Code?
England — Colourful puzzle and two-part quiz
Junior education and children's programs also available. SAE for details.

£5 each incl. £6 for two. Mail order only

SWIFT LINK SOFTWARE
118-120 Wardour Street, London W1V 4BJ

ZX81 High Res Graphics Unit
£32 (excl. VAT)

Tel: William Haynes 01-969 0819
Tools for Living
Notting Dale Technology Centre
191 Freston Road, London W10 6TH
cheque/PO (add 15% VAT)
plus 75p p+p

COMMODORE III £264 (excl. VAT)
Programmers Reference Manual **£15.95** (0% VAT)

Tel: Chris Gurney, Dave Walsh or Floyd Paterson
Tel: 01-969 4058 or send SAE
Image Science Micro Computers Ltd
188 Freston Road, London W10 6TH
or cheques PO (add 15% VAT) and £5 for p+p

SPECTRUM POOLS, 16-48K screen printer output + free blank data tape, £4.95. ZX81 version (no free tape), £4. [redacted] W. Holman, 50 Camperdown Street, Bexhill, Sussex TN39 5BE.

ZX81 16K Zon X81 (sound generator). 14 professional tapes, magazines, manuals, leads, etc. £125. Tel: Wrexham 339

CHEMISTRY EXAMS? No problem with alchemy software. Six programs covering formulae and calculations for O/CSE each, with extensive notes for ZX81 and Spectrum. Send sae for details to: Alchemy, 78 Tweendykes Road, Hull.

"MURDER ON SPEC" for 16K Spectrum:

A brain-teasing whodunit game for 1-7 players. 60 suspects, solutions with motives, graphics, in 4 parts covering far more than 16K: **£5.50**

"CRICKET ON SPEC"

Summer's coming! Refreshing 16K game with full range of shots, complete scoreboard. **£4.50**

MICROJUICE
46 Aingers Rd., London NW3

AGENTS REQUIRED

to sell popular computer books, software and magazines to micro dealers, bookshops and newsagents, including "RAINBOW" and latest new magazines from USA.

Generous commission levels.

ELKAN ELECTRONICS
11 Bury New Road, Prestwich, Manchester M25 0LZ. Tel: 061-798 7613 (24 hours)

ORIC 1 CASSETTE LEADS

WITH MOTOR CONTROL
DIN to DIN or
DIN to JACKS

£2.50

Orders to
Clares, 222 Townfields Road,
Winsford, Cheshire CW7 4AX
Tel: Winsford 51374

EXCELLENT

say R. Massingham of Batley W. Yorks of [redacted] McAlister of Lakenheath, Suffolk.

Cassettes for ZX81 - 16K or SPECTRUM

NASTY MOUNTAIN £4.95

Escape if you can!

VERY NASTY MOUNTAIN £6.95

Advanced version with [redacted] levels of play

Cheques/P.O.'s to Gilmore Ltd. DEPT POP, PO BOX 50, RUGBY, WARKS. CV21 4DH

SOFTWARE AUTHORS

We are a company specialising in the publication of educational software for computer-assisted learning in schools, colleges and the home. If you have written programs or have ideas that you would like to see developed, we would be very happy to hear from you. We can offer extremely attractive royalties and conditions, and the assurance that you will be dealing with professional educational specialists. If you would like further details, please write to our Software Development Director.

GARLAND COMPUTING
36 Dean Hill, Plymouth PL9 9AF

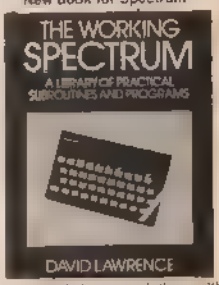
★★ LYNX SOFTWARE ★★

3D MAZE. Find the exit from the 3D maze-resolution graphics! maze.
BREAK OUT. The knock out the wall game.
PACMAN. Eat the dots, avoid the ghosts
All for £5 on tape from CLIVE CARTER, 110 Limecroy Street, Bargoed, Mid Glam. CF8 8TP.

SPECTRUM FORTH on cassette. Most timings actually faster than Jupiter Ace. All Forth structures. Colour, high resolution, and 256 user definable, graphics. Complete with comprehensive instructions. Immediate despatch. Order as SP48C (48K) or SP16C (16K — less memory and UDGs). Just £5.95. Send to: Mike Hampson, 7 Hereford Drive, Clitheroe, Lancs BB7 1JP.

FLY THE DRAGON flight simulation program for Dragon 32. Full colour and instrumentation, cassette only £5.95. Mr Ratcliffe, Church Lodge, Tibenham, Long Stratton, Norfolk.

New book for Spectrum



Published in association with *Popular Computing Weekly.*
228 pages. Over 150 subroutines and programs.
Send cheques/postal orders, for £5.95, to The Working Spectrum, Sunshine Books, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF
We can normally deliver in four to five days.

JUPITER ACE USERS CLUB

Adapter for ZX81 add-ons now ready. Also software, newsletter. SAE for details.

Ramsoft, 18 George Street Brighton BN2 1RH

SPECTRUM EPROM CARD (£19.50). Plugs into a motherboard (2 slot-£18.95). Uses unused Rom space 14592-15615 and 2516/2716 (2K) and 2532 (4K) EPROMS. Tape controller optional extra (plus £3.45).

Many possible uses including special character sets, machine code and Basic. 0/16 (2K) Ram + ADAPTOR (£9.95) plugs into Rom card. EPROM 51 (2K) (£9.95) programmed with RENUMBER (including GOTO, GOSUB, RESTORE etc) SPRITE characters printed from any start position, any magnification, rotated and reflected. WORD PROCESSOR for preparation of TEXT with justification. UDG character sets + many others.

Also available ZX81 EPROM-READ CARD (£8.75). EPROM 1 (with BREAKOUT, LIFE and TOOLKIT (£8.25). 2716 EPROM PROGRAMMER (£29.75). 25U P.S. (for programmer) (£8.50).

P + P £1 (UK only). £2 (overseas).

SAE please for extra details. ORME ELECTRONICS, 2 Bampfylde Road, Camborne, Cornwall.

JUPITER ACE, use ZX81 add-ons, assembled tested interface only, £8.75 to [redacted] Haydon, [redacted] Manchester Mansions, London, N19.

DRAGON 32? The Scottish Dragon Club welcomes new members. Send [redacted] for membership card, free games tape, newsletter, etc . . to The Scottish Dragon Club, TF, 1 Walker Street, Edinburgh.

64K SPECTRUM ADVENTURE. Fits into 16K Spectrum in four parts. Eight trolls, witches, madmen in over 150 locations. Plus spectacular Missile Command with machine sound. Both for £5. Mark Aldrich, 57 Everard Avenue, Bradway, Sheffield.

SWAP my new 48K Spectrum for your Texas Instruments 99/4A. Tel: 0832 320510.

VIC20 (UNEXPANDED) SOFTWARE. Excellent value, over 20 fast action games only 99p each. Send £1 for a space game + list. D Spencer, 230 Lowgrange Avenue, Billingham.

2 MONTHS OLD ZX PRINTER + 2 rolls [redacted] paper, £45. Tel: Chelmsford 400722.

Z80 OPCODE WALLCHART, over 550 mnemonics, decimal, hexadecima and binary codes and ZX81 characters in blockform for instant selection on non-reflective 29in x 35in wallchart, £4.30 + 35p P&P. Felix Computers, 48 Thorold Street, Boston, Lincs. Tel: Boston (0205) 66400.

PUT YOUR COMPUTER to good use for pleasure or profit during the 1983 Flat Racing season. For details of the most-up-to-date method ever devised showing 80 per cent plus winners over National Hunt season to date (proof available), send SAE to: Computer Rating Methods, 14 Langdale Place, Newton Aycliffe, Durham DL5 7DX.

DRAGON 32 SOFTWARE. Business, educational and games including Tables £2.95, Math-Drill £3.95, Chess £7.95, Space Invaders £6.95, Scarfman (PacMan) £7.95, Letter Writer £9.95, Mailing List £19.95. Send sae for complete list. Cheque/PO ■ ■ Mistry, 75 St Margaret's Road, Bradford BD7 2BY.

DRAGON 32 OWNERS. Now a listing service for your programs, only 1p per line (minimum £1). Send tape to Listing Service, 6 St Annes Mansions, Montefiore Road, Hove, Sussex.

COMPUTER GRADE C15 CASSETTES at great prices. Ten for £6 including p&p, 25 for £18.95 including p&p. Send cheques and POs to: Loophole Software, Arkwright House, Alexandra Road, Llandrindod Wells, Powys.

MELLOSOFT ZX81 16K PHARAOHS TOMB ADVENTURE — with nasty twist. Search for the Golden Urn and escape with it. Not like others, fast responses, illustrations, some animated. Quality tape. Immediate despatch, £3.95 cheque/PO. J. S. Mellor, 8A Camden Street, Plymouth, Devon.

DRAGON 32 MERGE PROGRAMS. Programs can be fully merged on the Dragon 32. For full details and instructions send £1 plus sae to: G Grimwood, 'Allanwoods', 105 Conway Road, Colwyn Bay, Clwyd

COMMODORE PET 8K old Rom integral tape recorder. Ideal for beginner. Complete with books and software, including Microchess and professional games and mathematical programs. £195 the lot. Tel: 01-398 5228 evenings.

POOLS PREDICTION DATABASE. We can supply English Football League results 1977-82 in computer format, with starter analysis programs. Disc/tapes £15 (two-year tapes £7.50) Sinclairs, BBC, Pet, VIC, TRS, IBM, etc. Selec Software, 37 Councillor Lane, Cheadle, Cheshire. Tel: 061-428 7425 (Access Barclaycard welcome).

VIC — 8K Ram Pointmaster joystick, 8K Defenda, Traxx, Myriad (3K), Skramble + other software, £45. Tel 021-440 2124 evenings.

SPECTRUM OWNERS! ZX Namidar — first version of this great arcade game for the 16K Spectrum. Paint in the areas of the screen, but avoid the patrolling guards. Colour, sound, hi-res all superfast machine code. £3.95. Cheques: Neil Dewhurst, 2 Chesterbrook, Ribchester, Preston PR3 3XT.

PERSONAL COMPUTERS bought for cash. Morgan Camera Co, 160 Tottenham Court Road, London W1. Tel: 01-388 2562

ORIC-1 Tangerine created Oric-1 now we create the rest. An independent users group with a solid reputation for progressive system support. Monthly newsletters, software, hardware, reviews, advice and lots more. We have a proven record of performance on our system. Join TUG. You'll like us, we do! Send sae (A4), Tangerine Users Group, 1 Marlborough Drive, Worle, Avon BS22 0DQ

DUST COVERS available for any computer, printer, etc. BBC, TI, Epson £3.95, Dragon, Atari, Vic20 £2.95, Sharp MZ-80A-K £4.95. For others please phone or write to Sherborne Designs, Victory House, 6A The Rank, North Bradley, Trowbridge, Wilts. Tel: 02214 4425. Also made-to-measure service. Dealer enquiries welcome. Access and Barclaycard

PROGRAMMERS. We offer good royalties for original Dragon, BBC or ZX81 16K programs. We promise a firm offer, or the return of your tape and postage within seven days. Words and Pictures, 7 Hawthorn Crescent, Burton-on-Trent

VIC20 (unexpanded) super arcade action games tapes! Colour graphics and sound! Games tape No. 1: Punkman, Black Knight, Cavern Shoot, Grand Prix, Side Shoot, Amaze. All six for £5 including p&p. Games tape No. 2: Froggy, Bomber, Breakout, Nibbles, Bank Robber, Space Gobblers. All six for £4.95 including p&p. Fast delivery, from Starraker, 21 Hoyle Road, Hoylake, Wirral L47 3AG.

DRAGON 32. Five exciting games, only £4.40. Bulls & Outs, Ratrap, Earth Defence, Mazerunner, Hamurabi. Argent Software Ltd, 25 Lynwood Chase, Bracknell, Berks (PCW)

SUPER PROGRAMS ZX81 (16K), only £2.50 each. Pontoon, Road Race, Hangman, Latin Test, Latin Translator, Mathematical equations, simultaneous equations, mathematical table (squares, square roots, cubes), Alphasort. Order today! Peekas Programs, 70 Grafton Way, London W1P 5NL. Tel: 01-388 2051)

SPECTRUM GRAPHICS PROGRAM (16K/48K, 256 pre-user-defined graphics, allows you to select your 21 UDGs with instructions. Contains aliens, men, digits, pictures, etc, on cassette. Cheque/PO £5 — A. Foster, 96 Worth Road, Poundhill, Crawley, Sussex RH10 4DU

ZX81. Hardware software, giving hi-res plotting, games, tower case, user-definable characters (and free Pac-Man game). Only £17.45 all inclusive. M. Whitfield, 66 Bramblebury Road, London SE18

WANTED, TRANSAM TUSCAN computer system. Also Transam case, Ram disc controller card, disc drives, etc. Good price paid. Tel. Chris Whittington, Uxbridge (0895) 31579

SOFTWARE EXCHANGE. Swap your used software via our club. Free membership, £1 per swap. Most computers included. SAE for details. UKSEC, 15 Tunwell Greave, Sheffield S5 9GB

SPECTRUM WANTED, lowest price please. Kendall, 4 Howlets Terrace, Chelmondiston, Ipswich

Computer Swap 01-930 3266

Free readers entries to buy or sell a computer. Ring 01-930 3266 and give us the details.

Spectrums for sale

16K ZX SPECTRUM + software, + tapes, hardly used, £100 ono. Tel: 061 434 1939.

SPECTRUM, 16K with five cassettes including Pacman and Gorf. Only 4 months old. All leads and manual £95. James Evely. Tel: (Coulsdon, Surrey) 52594

16K SPECTRUM, 2 months old, 10 months guarantee, software and magazines £115. Tel: 01-316 0020.

SPECTRUM 48K, unused, still boxed, unwanted gift. £140 ono. Tel. R Yearley, 0256 50482, between 5.15 and 6 pm only

SPECTRUM 48K, £20 software, £160. Tel: 0329 664200 after 4 pm.

48K SPECTRUM, printer and many tapes including all leading games, Chess and Viewfile, worth over £320, perfect working order, best offer near £200. Tel. 01-449 3687 evenings.

48K SPECTRUM + cassette recorder, printer, software including Hobbit, compiler and time gate, etc, £210. Tel: 01-958 9442 after 6 pm.

SPECTRUM, 16K, over £25 of software, sound amp., two games books + magazines, own cassettes £135 ono. Tel Southampton 462397

SPECTRUM, 16K printer, software, books, £110 ono. Tel: 01-874 7175

48K SPECTRUM + £170 software, brand new. £220 ono. Tel. 01-670 4006 (after 5 pm + manuals

48K SPECTRUM, £50 software + books, £160 ono. Tel Reading (0734) 477715

16K SPECTRUM, one month old, still with box + few games, £120. Tel: 01-402 8570

16K SPECTRUM, manual, leads + software, cassettes, £100. Tel: 01-773 0495

ZX81s for sale

ZX81 + printer, good condition, paper + flight simulator + books, £80. Tel Harefield 3065 (evenings) (Middlesex)

ZX81, 16K, keyboard, manual and leads, £25 of software £95. Tel: 01-839 9435 (Southwark) after 5 pm.

Z81 MEMOPAK 16K, excellent condition, some books £65 ono. Tel: Hitchin 50100 evenings

ZX81, 16K, + leads and games cassettes, boxed as new £45. Tel: 01-739 7502

16K ZX81 + software, magazines and tapes including Scramble £60. Tel: Peterborough 261870.

ZX81, 16K, PSU, all leads + manual, very good condition £45. Tel: 081-483 4921

16K ZX81 SINCLAIR, boxed, guarantee, cassettes, books £64. Tel: 061-427 6542.

ZX81, 16K, all leads, 4 adventures, every issue of Sinclair User £45. Tel. 01-864 8574 (South Harrow).

ZX81, 4K, Fuller keyboard, video convertor, £38. Tel: Bollington 72410.

ZX81 16K, little used, £40. Tel: 01-485 4884 after 6 pm.

SINCLAIR ZX81, 16K, leads, boxes, £75 software, magazines, etc, two months old, £100 ono. Tel: (0590) 72191 after 4.30 pm.

16K ZX81, Sinclair-built, economy Ram pack, keyboard + software and magazines, boxed and guaranteed, £65. Tel Leeds 638739.

32K ZX81 + hardware, keyboard + 3-channel sound and software and books, £150. Tel: 01-958 9442 after 6 pm.

ZX81, keyboard, 4K graphic Rom, 2K Ram, 16K Ram, payroll, chess, invaders, scramble, asteroids, 5 books + magazines, cost £250, £115 ono. Tel: Mareham-le-Sen 380.

ZX81, + Memo tech 16K, Adventure Game cassette, all boxed, as new, £55. Tel: Uxbridge 56352, evenings.

ZX81, 16K, DK Tronics keyboard + case + manual, leads + £30 software + book. £110 ono. Tel. 01-674 0781 after 5 pm

SINCLAIR ZX81, 16K, perfect condition, boxed, + books + progams, £55. Tel: 01-398 6512.

16K ZX81. Excellent condition, £65. Tel: Solihull 743 3835.

ZX81, 16K, sound box, lots of software, typewriter keyboard, £80. Tel: Bognor Regis 865597.

ZX81 16K printer, cassette deck, Chess, 2 Text, £80. Tel: 0634 362938.

ZX81, 16K, + cassettes, + software, magazines, leads, manual, £70 ono. Tel: 0703 788746 after 5 pm.

ZX81, 2 months old, memo pack, 16K, new power supply, cassette leads, £150. Software, mags, books, £85. Tel: (0722) 27219 evenings.

ZX81, 16K, m/brd/k/brd, £20 software including books, £100 ono. Tel: (0494) 716080

ZX81, Sinclair, 16K Ram, £60. Tel. Bristol 646995.

ZX81 16K Ram Kayue keyboard, with repeat key, over £40 of games software, £100. Tel. Hope Valley 0433 30214, 4.30 to 8.30 pm

ZX81 + Memotech, 16K + few games, leads, manual + power pack, less than 2 months old, £60. Tel: Basildon (0268) 27386

Acorns for sale

BBC, B, two months, with Ferguson recorder, books, NEC, £350 ono. Tel: 01-561 6221 ■ pm)

ACORN ATOM, 12K plus 8K, books, software, £150 ono. Tel: 0234 823379 (evenings)

BBC MODEL B, 32K, little used with cassette recorder, joysticks and leads. Also Acorn software, Snapper, Defender and other software, £380. Tel. 01-653 1922 after 7 pm.

ACORN ATOM, 12K + 16K, floating point, toolbox, Veet chip, PSU, manual, over £120 of software, excellent condition, cost £370. Phone for offers, £200 ono. Tel: Dalton (0725) 20609 (6 pm).

ACORN ATOM 12K RAM, plus 12K ROM including SP, plus TSU, all leads, manuals, magic book, 6502 book, software, micro budget Golf plus games, £160 ono. Tel 593-6742.

ACORN ATOM, 12K+12K plus PSU, manuals and cassette, leads, original box including machine code Arcade games worth £30, only £130. Tel Bedford 712838

ACORN ATOM, 12K Rom, 12K floating point Rom VIA chip, cassette, books and magazines £110. Tel. 0625 873461 evenings

ACORN ATOM, 12K Ram, 12K Rom (including floating point), power supply unit, manual, cassettes, software, books, recommended cassette deck, all connective leads. As new, £225 ono. Tel: Canford Cliffs (0202) 709502

BBC MODEL B, hardly used, original box, £150 software including chess, monsters, etc. Offers over £390. Tel. 0632 853565.

BBC MODEL B with joysticks, games, books + custom-made wooden case, £350. Tel. Wakefield (0924) 252142, after 5 pm

ACORN ATOM, 12 + 12K, + all fitments, including tool box, £200 software, loads of books, the lot £100. Tel: 01-992 8249

ACORN ATOM, 12K + 12K tool kit, printer, interface, various books and software including Chess and Invaders, £185. Tel. Horley (02934) 73524 (evenings)

ACORN ATOM with 12K RAM + 8K RAM + 7 program cassettes and A:A Magic Book, £140 ono. Tel. 398 1230 (evenings).

ACORN ATOM 12K Rom, 12K Ram, with books, brand new, AF toolbox and floating point Rom, £150. Telephone Botley (Southampton) 04892 6528, evenings.

ACORN ATOM, 12K + 12K, psu, books, £150 ono. Tel: Bolton 66551, ext 3232 (working hours) Mr Barton.

BBC B, 1 month old, £360. Tel: 061-477 3078.

Ataris for sale

ATARI cassettes, Airstrike, Darts, Canyon Climber, £8 each. Tel: 01-203 4545. Also swap Submarine Commander and Crazy Antics with other arcade cartridge.

ATARI VCS CARTRIDGES. Huge reductions, ranging from £7 to £20, plus main console for £30. Tel: Worthing 45200.

CANYON CLIMBER 16K cassette for Atari. £8. Swap Crazy Antics cartridge with any other. Tel: 01-458 9834.

ATARI GAMES CARTRIDGES. All in very good condition. Breakout £9, Othello £9, Space Invaders £12, Video Chess £12. Tel: Norwich (0603) 712320 after 6 pm.

ATARI, seven cartridges for sale, all for £15. Tel: 01-402 8570.

SWAP Submarine Commander (Atari 400) for Caverns of Mars + £5 or the book Deans Atari, £15. Tel: 01-858 2849 after 6 pm.

ATARI VCS + 8 cartridges, joysticks + pedals £110 ono. Tel: 03952 73235.

ATARI 400-800 software for sale. Rearguard £10; EMI Snooker £2. Tel: 0743 5206 after 6 pm.

ATARI + seven cassettes, PacMan etc, £130. Tel: 01-958 6161.

ATARI 400 + recorder and joysticks + all P.S.U. manuals + leads + £175 software £360. Tel: 0443 450840

ATARI VCS + 16 cartridges, £180. Tel: 01-476 9585, work, Mr M. Vick.

ATARI 600, cassette deck, over £110 of software, de re Atari, joystick, paddles, leads and wires + £20 of magazines, £450 ono. Tel: 01-824 7074

ATARI 400 basic cartridge program recorder chess cartridge, joystick, plus manuals, 3 months old, under guarantee, £250. Ring: 01-883 3420.

ATARI VCS CARTRIDGES, as new, with instructions, in box. Missile Command, £18; Night Driver, £14; Space Invaders, £15; Laser Blast, £12. Tel: 08823 254 (weekends)

ATARI VCS games system, + 6 cartridges, Defender etc, new, £230, offers £115. Tel 01-997 2017.

ATARI VCS, three months old, 12 cartridges (ET, Star Wars, Soccer etc.), including joysticks, paddles, lead. £150 ono. Tel: Preston 323148.

Commodores for sale

VIC20 ACCESSORIES, super expanded. £25, 8K Motherboard + battery back-up £30. Boss Chess Game, £8. All as new. Tel: Yateley (0252) 871813.

OMEGA RACE CARTRIDGE for Vic20. £20 ono, or swap for marker board. Tel: Matlock 823 752 after 6 pm.

SUPER EXPANDER FOR VIC20 for sale, + 3K Ram £25 ono. Tel: Peterborough 242811.

VIC RAT RACE to swop for Vic Slot. Tel: 0752 260186.

SWAP PIRATE COVE for either Sargon II chess, Vic Synth, or The Count. Tel: Barnsley 723442 after 5 pm.

SWAP TIME MACHINE for any other Vic adventure. Tel: 061-445 6630.

VIC SOFTWARE. Superlander Cartridge, VicMen Asteroids, Vic Six, Vic Trap/Seawolf. Books, programs, reference guide. Get acquainted with Vic, program with Vic, £25. Tel: (0387) 62620 evenings.

SWAP COMMODORE Pirate Cove adventure for Mission Imp. Tel: 051-677 6817.

SWAP VIC20 ADVENTURE CARTRIDGE, Mission Imp for Adventureland or Satellites or Meteorites. Tel: 0325 316956 after 6.30 pm

VIC20 — swap Adventureland cartridge and The Count for any other adventure or Gort. Tel: Swanley 67514 after 4 pm

VIC20 Adventure Account, swap for Omega Race or Spiders of Mars or good software. Tel: 0274 677647.

SWAP VIC20 Gort cartridge for Omega Race or Jelly Monsters or Star Battle cartridge. Tel: Crayford 58911 after 6 pm.

VIC20 CARTRIDGE, The Count for Voodoo Castle or Pirates Cove. Tel: 01-653 7086

VIC20, 4 games for sale, Mission Impossible Adventure, £20 Rabbit Ski Run, £2 Rabbit Night Flight, £2 Rabbit Space Storm, £3. Good condition. Phone Cuffley 2037 after 6 pm

SWAP: Count and Mission Impossible VIC cartridges, for other VIC adventure cartridge. Tel: Chandlersford (04215) 3561

SWAP, Rabbit software Myriad for Defender Tel 0749 78660

SWAP my Vic 1515 converted 8½ inch tractor feed printer + 5 inch Waltham tv-radio-cassette portable combination set + 2 boxes 4,000 sheets 8½ inch paper, ½ box 8 inch for friction/tractor feed printer in perfect condition, suitable for Vic 20. Telephone 01-840 3610.

SWAP VIC20 Mission Impossible cartridge for any other adventure cartridge. Tel: Northwich (0606) 77446

SWAP TIME MACHINE ADVENTURE for any other adventure in the series. Tel: 08956 38564, ask for Joel

3K RAM PACK for Vic20 and adventure games — Scot Adam's Voodoo Castle and Alien, £15 each or will swap games for other adventures. Telephone Richard on 0990 22141 (daytime)

VIC20 GAMES for sale or swap, including Night Crawler, Moons of Jupiter, PacMan, Alien Blitz, Amok, Vic Gammon, Star Trek, Frogger and many more. Tel: Dave, Bedford 66010, after 6 pm.

VIC SUPER expander cartridge, £25 (as new). Mr N. Passmore, 22 Adscombe Avenue, Bridgwater, Somerset TA6 4NH

MISSION IMPOSSIBLE for the Vic20, £16 or swap for three 16K cassette games. Vic Panic, £4. Tel: 0772 744439.

16K RAM EXPANSION, Vic20, £50 ono. Tel: 0744 52889 after 5 pm.

VIC20 TRADER (16K adventure cartridge), swap for any Scot Adams adventure cartridge, will pay up to £6 extra. Tel: 01-515 4696.

WILL SWAP VIC20 Adventureland, Mission Impossible, Star Battle for other Vic cartridges. 061-678 8194 (Oldham).

SWAP VIC20 SOFTWARE: Pirate Cove, Spiders of Mars, Hopper for similar software or 8K Ram, VIC revealed, program reference. 061-368 6935 (6 pm).

WILL SWAP Omega Race cartridge for Gort or any adventure or Rat Race, Wetry Rocks 550 546.

VIC SUPERLANDER, £10 or swap for Gort + cash difference + introduction to Basic Part 1, £6. Tel: 0242 513450.

MISSION IMPOSSIBLE. Swap for any other adventure. Preference Voodoo cartridge. Tel: 08956 38564, Joel.

SWAP Pirate Cove for other adventure cartridges (not Voodoo Castle). Tel: Sheffield 582322.

VIC20 River Rescue cartridge + Alien + cassette (Andy's Attack) Swap or sell. Tel: 01-458 7277.

SWAP VIC game cartridge. Tel: 08956 38584.

SWAP VIC20 Adventureland cartridge for any other in series. Also swap 3K Ram for software. Tel: Huntingdon (0480) 55645.

VIC20 CARTRIDGES to swap or sell. Tel: 01-954 4548.

VIC20. Swap Adventureland, Vicgammon for any other games. Tel: Stevenage 61765

VIC20, 16K. Swap Arrow of Death Part 1, for any other adventure. Tel: Sunderland 652527 working hours

SWAP VIC20 Pirate Cove cartridge for any adventure except Ad Land. Tel 0508 267526

VIC JOYSTICK + Vicmen cassette. Tel St Alban 750696

VIC20 colour computer for £95; Commodore cassette unit for £35; 16K Ram memory for £60 (new) or the educational programs for £40 or all for £210. Tel: 0608 75119.

COMMODORE PET 32K, 9in screen, Basic 4 (and Basic 2 Roms included), Visicalc, toolkit, reset, light pen, cassette, extensive free software to choice, including games and business. Books and manuals included. CBM, Osborne, Pet Revealed and TIS Workbooks. Want £375 ono. Tel: 0203 383212 Monday-Friday anytime, 0993 830246 weekends.

VIC20, + cassette unit, super expander, machine code monitor machine code book, various programs £210. Tel: Caterham 45776.

SWAP VOODOO CASTLE for any other Commodore adventure. Tel: 0493 668234.

VIC20 + £200 cassettes + cartridge, software. Best offer around £190 secures. Tel: 01-656 0511.

VIC20 C2N CASSETTE DECK + joystick £130. Tel: 01-467 5242 evenings.

VIC20, cassette unit, 3K Ram pack, 17 software cassettes, a joystick, 9 months guarantee £140. Tel: Northampton 48829

VIC20. As new, still boxed + software, cartridges and cassettes. £115. Tel: Chris, 01-883 9321

VIC20, cassette deck + games. £220 + extras. Tel: 01-508 5238.

VIC20, C2N, 16K, super expander, joystick, £350 software. Many more programs + utilities, £350. Tel: 0242 513450.

VIC20 plus cassette unit, plus 1515 graphic printer, three cartridge games and super expander, joystick, light pen, three books plus cassette software, £400 ono. Tel: Otford 739801

VIC20, as new, with C2M cassette units, joystick, super expander cartridge, programmer's aid cartridge, 4 cartridge games and cassette games, £300. Ring Llechryd 200.

VIC20 CARTRIDGES, Supershot, Star Battle, Superlander, £15. Vic Panic Game, £5; The Count, £20, or swap for Voodoo Castle or Pirates Cave. Ring: 01-508 9558

VIC20, £95. Tel: Goole 860420.

SWAP VIC 20 + cassette deck, brochures, booklist and many kinds programming tapes, for BBC Printer or Disc Drive or Monitor, with leads. Tel: 01-508 5238.

VIC20, + cassette deck, super expander, 3K RAM, BRD + dust cover, + £50 software, + Vic MAG, excellent condition, only £250. Tel. Plymouth (0572) 880781

32K PET, Rev 3 Roms, cassette recorder + 100 + cassettes, disco pro-chip, £450 ono. Tel: 01-398 6963.

VIC20 SUPER EXPANDER for sale, £25 ono. Tel: Peterborough 242811.

COMMODORE VIC 20 + C2N cassette drive + 3K RAM programmers reference guide plus £175 worth of software including 3 adventures, and dust cover, £275 ono. Tel 01-561 6958 (evenings between 5 and 6 pm).

VIC20 plus cassette deck, Jelly Monsters cartridge, Wacky Waiters and other cassette software, new in November, excellent condition, still guaranteed, cost new £228, offers around £150. Tel: 0522 730448 (after 5 pm)

VIC20 +cassette unit + 16K stack monitor board + stack Vic kit 2 programmers and tool kit + intro to basic part 1 + software, £250 ono. Tel: Botley 3184 (after 6 pm)

MOON Prodlander, for Vic20, £3. Tel: Cambridge 871584.

16K CARTRIDGE and machine code monitor cartridge for Vic20 £55 and £25. Tel 01-202 3624 (evenings).

COMMODORE 2002, 8K, small keyboard, integral input cassette, 1-memory cassette, checked by Commodore. Bill available. Lots of books and games, £250. Tel: Chalfont St Giles (02407) 2435.

VIC20 + 6 cartridges, super expander, Gargon II Chess, Pirate Cove, etc, etc, + much software, £190. Tel 01-858 0511

VIC20, memory expansion + 3K, cassette recorder, 2 games, £20, books, 10 cassettes, £270. Tel 01-853 0021.

VIC20, cassette 8K, super expander, £100 of software + books, £210 ono. Tel: Flint (03526) 4985.

VIC20, swap Adventure Land for Gort Omega Race, or any other adventure. S. Adams Tel 021 556 0775.

PET 32K, new Rom, large keyboard, separate recorder, tool kit + software on cassettes, £300 ono. Tel. 01-560 0793

Tandys for sale

TRS80, Model I Level 2, 16K, VDU with green screen, cassette recorder, joystick, fitted table/trolley, approximately £400 worth software, lots of magazines £225. Tel: 01-594 0894.

VIDEO GENIE 16K internal cassette plus 12in black and white TV also additional cassette recorder, TRS 80, Basic book £220 ono. Tel: 0703 431973.

GENIE 1 16K, under 12 months old, including cassette-based spread sheet program. £250. Tel: 028-685 545.

TANDY 16K Model 1 Level II TRS80, complete with TR80 cassette recorder, green screen VDU, stacks of software, stacks of books. Offers in the region of £300. Tel: Sellindge, Kent - 030381 3336.

48K TRS 80, cassette system, latest Rom + exp. interface + quick printer + numerous well-known books and tapes. Any reasonable offer, whole or part. Tel: (0949) 60869.

TRS 80 EXPINTER FACE, 32K. £110 ono. Aculab floppy tape with extended basic + 20 tapes. £75 ono. Tel: Bolton 41459.

TRS 80 Model 3, 48K, as new. £550 ono. Tel: 061-928 3640.

TANDY POCKET COMPUTER II + plotter with programs. £250 ono. Tel: 01-937 5578.

TRS 80, level 2, 16K + Tandy cassette recorder. Many tapes and manuals, under guarantee, £200. Tel: 01-891 2761

VIDEO GEN! EG3003 16K sound output, 3 manuals, games, £150. Tel: 0344 29741 (after 6 pm).

TANDY MODEL I, level II, 32K, exp/int, VDU, cassette, printer 7, manuals, dust covers £550. Tel: Biggin hill 71740.

TANDY TRS 80 Colour/Dragon, home accounts tape, balance cheques plus eight accounts itemised. Save data to tape, retrieve one to twelve months totalled data, only £3.50. M. Trigg, 12 Whiteways Road, Sheffield.

TANDY TRS-80, Model I, level II, 16K. CTR. ACA recorder, £100 ■ software + books, under guarantee. £175 ono. Tel: 01-891 2761 anytime.

BRAND-NEW video colour Genie, £180. Ring: 0292 520580

TRS80 LEVEL ONE with cassette recorder, machine code manual, basic manual, leads, etc., plus adventures and some invader games. £150 ono. 01-854 0476.

TANDY TRS80 pocket computer, same as Sharp PC1211 with cassette interface. £60 ono. Tel: 01-202 3624 (evenings)

VIDEO GENIE, Model T3, 16K, Level II, integral cassette, software including editor/assembler, home budget, wp, dbm, games and utility. £250 ono Tel: 031-449 5030, anytime

VIDEO GENIE, joystick, sound, dust-cover, manuals, books + magazines, £200 of quality software, £200 ono. Tel Bedford (0234) 63806.

For sale

KEMPSTON joysticks for sale, £20 (not used often). Tel: 01-723 9947 after 4.30 pm (not Thursdays).

VK101, 8K, £90. Tel. 021-421 4926.

DRAGON 32 plus joysticks, two adventure cassettes, Grand Prix cassette and Beserk cartridge, cost £240 will sell for £180. Reason for sale getting bigger business system Tel. Manchester 061-724 8105

MENTA 280 development system, PSU + manuals £75 ono. Tel: 061-428 7312

DRAGON 32, new, boxed, manual, working Dragon 32, £170 ono. Tel: 01-651 3663 after 4 pm.

NEW BRAIN, Model AD, perfect condition, manuals + leads. Offers over £240. Tel Cottingham 50700 evenings after 5 pm.

DRAGON 32, new. Tandy Basic book £170 ono. Tel: Horwich 692933

DRAGON 32, joysticks, Ghost Attack, cassette software, leads £190 ono. Tel: Radlett 6544.

PHILIPS TV GAMES COMPUTER £45 including one games cartridge, extra cartridges £8.50. Tel. Hereford (0432) 265172.

REALISTIC DX160 communicabons receiver to swap with ZX printer (receiver worth £120 new). Tel: Jerry 01-553 7094 (daytime, weekday).

SHARP MZ80K, 50K. 4mhz, Quantum high res graphics, green screen, Basic, fortran, fourth, assemblers, many programs, games, books plus newsletters, £360 ono. Tel: 01-316 1692.

DRAGON 32, joysticks, leads, cassette recorder, four cartridges, six tape games worth £360+. Yours for £260 ono. Tel: Reading (0734) 473553.

JK GREYE CASSETTES. 3D Monster Maze, games tape 2, Catacombs, Microgen Chess £3.95 each. Tel: Bitern 4038.

SHARP MZ80K (48K), green screen, dustcover, manuals, books, magazines and relevant like, 3 basics, Forth for Tran, Pascal + 200 games + applications. Upgrading to MZ80B, £450. Tel: Watford 46955.

SWAP your unwanted Mystery Fun House or other Scot Adams Adventures, for my Solved Pyramid Doom Adventure for TRS80. Tel: 061-962 7295 after 6 pm.

SWAP Intelligent Chess Computer, as new, cost £279, swap for 48K Spectrum of Dragon or other. Tel: 01-556 8142, Mr Nicholls.

ATOM, 12K Ram, PSU, £20 software, one year subscription to Software Club, £150 ono. Tel: Hornchurch 73458.

FIVE ROLLS of ZX printer paper, £8 ono. Tel: (0204) 29910.

SWAP VIC Asteroids, Sea Wolf, Breakout, Vic Trap, Amok, Fruit Machine for Panic, Golf, Defender or other. Tel: 051-489 2545.

SWAP old version of Acorn soft snapper + Arrow of Death Part 1, Atlantis (originals) for any other BBC progs. Tel: Sheffield 306275

VIDEO CONSUL, ICL swap for colour TV or sell for £70. Tel: (0227) 782516.

UK 101, 9K Ram, cased with invaders + other software, £80. Telephone Croyford 53761

NEW BRAIN. One month old + books + one cassette, cost £240 sell £200 ono Tel 0799 22640.

UK 101, 8K Ram + plastic case, leads + programs, bargain at £89. Tel: 0795 22219.

48K, SHARP MZ80K, with high res 8rd, 4fron, Pascal, Pilot, Forth, M/C, and 9 Basics, inc XTAL Basic complete with £700 software, manuals documentation, original packing and delivery anywhere. £395. Telephone (05438) 5265

TI TEXAS 99/4A, including 3 plug-in modules + music maker, speech editor + hassler + joysticks + several cassette programs, £270. Telephone 01-807 5260. Will sell separately

MATTEL INLETTEVISION, + 3 games, £120 ono. Telephone 01-254 3229 (5 pm-7 pm evenings).

DRAGON 32 in box, as new, 2 months old with cassette recorder and six cassettes and one cartridge and one joystick and one book £250 Tel: 061-488 1496

8 BRANDED NAME game cassettes for Dragon 32, as new. Cost £60, accept £40 ono. Tel. Preston 323148

WILL SWAP or part exchange PC 1211 computer with cassette interface CE121 and printer CE122 and EA11E, A/c adaptor and manuals. All for £70. Luton (0582) 593 088.

MATTEL INTELEVISION + 8 cartridges, £99. Tel: Cumbernauld 6731153 Wednesday evenings.

MICRO TAN 65, with Tanex, graphics, assembler, basic, 8K Ram, power unit, keypad/keyboard, £180 ono. Tel: 01-941 2953

MISSILE COMMAND + Video Chess cartridge for Atari V.C.S., £30 or £16 each Tel: (0844) 290247.

48K SHARP MZ80K, high resolution board, m/c, 4 tram, Pascal, Forth, 9 Basics including Xtal, Zen assembler, many utility programs, £700 software, manuals, documentation, original packing and delivery anywhere £395. Tel: (05438) 5265.

FIVE INTELLIVISION CARTRIDGES for sale, £11 each, £50 for all five. Tel: Hook Norton 737224 anytime

VIDEO GENIE, 16K. Perfect condition, dust cover, all leads and manuals, £213 ono. Tel: Kidlington 77488 evenings.

DRAGON 32, with colour graphics, printer and leads, manual, books and £85-worth of software — Berserk, Chess, Meteoroids, etc — good condition, £390. Telephone Andrew on Ongar 363957 evenings

SUBERBOARD II, new basic 1, 3, 4, 5 and X, Segmon X, screen enhancement kit, toolkit 2, hi-speed cassette interface, cased, power supply, documentation and tapes, £100. Tel: 01-560 0793

DRAGON 32, boxed as new, £180 ono. Tel: 0292 89223 after 6 pm.

NASCOM 1 + power supply, keyboard, etc., £80 + Ohio super board Mark II + power supply, £70. Tel: 01-735 1862, Mr Bridge.

ACE, manuals, leads, recorder, games: Asteroids, two maze games, Night Rider, £90 ono. Tel: Lincoln (0522) 681592 (5 pm).

DRAGON 32, as new + leads + manual £170. Tel: 0277 215552.

SWAP Rowpron TV game + cartridge, including Space Invaders for ZX printer. Tel: 0691 830072

DEFENDER, MONSTERS AND GALAXIANS for sale, for BBC Model B, £10 each. Tel. Belfast 221868

SHARP PC 3201, with VDU + printer + disc drive, worth £2,700, will accept £1,590 ono. Telephone 01-952 4836.

SWAP DRAGON 32 Adventure Mansion for any data Dragon cassette. Tel: 0342 27072.

DRAGON 32. Four months old. Boxed, including all cables and leads, £150 + some software. Tel: 01-997 3498 evenings.

DO YOU WANT to swap BBC software for other BBC software? Tel: 0895-35129.

DRAGON SOFTWARE, sell or swap also large number of computer magazines. Offers. Tel: Ware (0920) 68264.

TRS 80, LEVEL 1, 4K, cassette recorder, games: Space Invaders, Logic, Adventure, 2 manuals, leads etc, £160 ono. Wood. Tel: 01-854 0476.

SHARP MZ 80K, seven months old, with assorted cassettes, as new, £350 ono. Tel. Farnborough, Kent 51863, evenings after 5 pm

AMOK £2. Another Vic in the wall, £2.50. Siege + Shadowfax, £2.50 each. Karim (5 pm—9 pm). Tel: 01-387 8751

DRAGON 32, as new, boxed, £24 of software including Defender, £175 ono. K. Newham 01-777 4714.

SEMCOSHA PRINTER G.B.80. £150 ono. Tel: 01-340 2318.

TANDY TRS80, Model 1, level II, line printer, tape recorder, £550 of software, bargain £495. Langley Mill 4875.

UK 101 8K. Unused. New monitor progs, book, etc, £100 ono. Tel: 01-809 3032 evenings.

DRAGON 32, joystick. Nearly new. £14. Tel Lansgate 4201.

SHARP MZ 80K, 48K. Still guaranteed, over 40 programs, including Sharp machine code, three basics, adventures, two data bases, chess, Invaders + others, £299. Tel: 021-458 4582.

ACETRONIC 1000 + 6 cartridges, 12 months old (boxed), £120. Tel: 051 920 9117 (after 6 pm)

ZX SPECTRUM PRINTER, hardly used + one cassette of machine code arcade games, £50. Tel: Harpenden 69152.

ZX PRINTER plus ■ rolls of paper in excellent condition, hardly used. Offer please to Avnish Goyal. Tel: Basildon 288271, 6 pm to 9 pm only.

SWAP SPECTRUM SPECTRES, Speakeasy, Space Intruders for other Spectrum tapes. All tapes originals. Tel. Harpenden 59152 for details

SHARP BARGAIN, PC 1500, pocket computer + CE 150 4-colour printer + 8K Ram, module + software, all £350 ono. Tel: 06667 546

ZX PRINTER PAPER, four rolls, £5 the lot. Bridgwater 56292

APPLE II 48K, Europlus, brand new, under guarantee. Visa-calc, basic computer, Apple Rider II (30 games £500), many more, £700. Tel. 01-402 5061 late evenings.

DRAGON 32, 6 months old, £180, + joystick £10. Tel: Ruislip 36215.

DRAGON 32, + joysticks, + £40 software, £150. Also ZX81 + 16K Ram, £50. Tel 01-690 3926 (evenings)

Wanted

8 OR 16K RAM PACK for Vic20. Tel Lincoln (0522) 702544

WANTED URGENTLY. BBC micro 32K, A or B. Tel. Middleton-on-Sea 2128

WANTED. 48K SPECTRUM + manual, leads + printer, paper books and games or any other accessories. Must be in good condition. Prefer London area. Tel: 01-904 5025 evenings only.

FOUR SPECTRUM BOOKS worth £21.80 at £10. Machine code test tool as new £6; QS Space Intruders £2; PSS compiler £5; QS Speakeasy ■. All originals. Tel: (05827) 69152

SPECTRUM 32K upgrade for issue one. Details and price. Tel 0792 792729

BBC MODEL B. Tel. Chester 570878.

WANTED URGENTLY

Arcade-type games programs for Spectrum, ZX81, Vic20, Oric, Dragon, BBC Micro and Lynx.
We pay top royalties or buy your copyright for cash.
National mail order and dealer sales ensure you get the best reward for your genius.

Write or call into

NORTHWISH LTD

THE GROUND FLOOR, RALLI BUILDINGS
STANLEY STREET, MANCHESTER
M3 5FD
or Phone 061-832 9143

SOLUTION IS A FREE COMMAND

J J Morgan of St Edwin Gardens, Heath, Cardiff, Wales, writes:

Q I was reading a letter from F Charlton in one of your issues. He has the same problem as I, but I own an Atari 400. I have searched through the manuals, but there is nothing on how to find out how much memory you have left in your program, or how much you are using. Can you help?

A You should not have this problem on an Atari as it has a *Free* command. Just enter this, and it will return the amount of memory left to the user as a number of bytes.

BREAK OUT ON THE ORIC

David Donald of Birmingham writes:

Q Like other people, I am trying to decide whether to buy an Oric-1 or a Spectrum. I wonder if you could answer some questions about the two machines to help me make up my mind.

Does the Oric have *Print At* and *Screen* like the Spectrum, or does it have equivalents? In the same way, does it have *In/Out* commands and *Read/Data*. Can joysticks be used and how easy will it be to use a proper printer? I have heard that it will be easier to interface other add-ons to the Oric than to the Spectrum. Is this true? How easy will it be to convert ZX programs to the Oric?

A Suddenly everyone wants to know about the Oric. the Oric does not have *Print At* or *Screen$*, but it does have *Curmov* and *Curset*. These will move the cursor to any point on the screen and print a pixel at that point, which then can be moved. It is also possible to print characters at a particular point using these commands.

There is a short one line program to save a screen picture, but there are no *In/Out* commands. Both *Read* and *Data* are available. There are no joysticks for the Oric yet, though I would expect some to come on to the market sooner rather than later.

The Oric has an advantage over the Spectrum in that it has a Centronics port, which will make it easy to interface with many printers. The Oric can also be used with most normal cassette players.

The Oric uses a 6502 chip and Microsoft Basic, so there will be several small differences between the two machines. Spectrum string handling uses *'From . . . To'* to split strings, whereas the Oric uses *Left$*, *Mid$* and *Right$*. The variable names can only be two characters long, though the sound commands are different by virtue of the fact that the sound facilities of the Oric are far more comprehensive than on the Spectrum. The Oric also features an emergency button to break out of closed loops and other user-induced crashes.

As long as no serious hardware problems develop, and the new magual is good, then I can see the Oric soon putting increasing pressure on the Spectrum market.

STUDYING CRIME AT 'O' LEVEL

D W Williams of Oxford Street, Blaenau Festiniog, Wales, writes:

Q For my 'O'-level in computer studies I am putting together a project on the subject of computer crime. I was wondering if you could put me on to any accounts of notable computer fraud? Also, do you have any information on the types of programs and measures that are used to combat both active and passive fraud.

A By its very nature, this is not the sort of subject that lends itself to easy answers. Big companies are extremely touchy about their security measures, and are unlikely to divulge them. If such information were printed, it would make the work of a thief much easier.

The only obvious sign of increased security is the need for identification that most companies now demand in their computing areas. The days are long gone when you could walk in with a fake appointment, ask the way to the toilet, get lost and 'find' the computer room.

Your only hope is to write to the various national newspapers and ask them to supply you with information. You can write to the major computer companies, but do not expect any real answers — this is a security measure in itself.

VOICE DETECTION CYCLES

Julian Miller of Ryash, Maidstone, Kent, writes:

Q I am the owner of a 48K Spectrum. I wonder if you could tell me how the *In* and *Out* commands work. How can they be used to detect a signal coming in on the 'EAR' socket. The manual does not go into enough detail. Also, could a voice recognition program be made out of the detection of such a signal?

A This is the sort of question that needs an article in answer it properly. You want to look at address 254. *In* 254 is not sufficient, as we are dealing with a 2 byte address. The first byte of this deals with the keyboard, and the ports D0 to D4. All the bits in this byte need to be set to one. Also, because the second byte deals with ports D5 to D7, and the EAR socket is D6, a base has to be found for no signal at the ear socket.

```
PRINT IN (255 * 256) +254
```

This will return a value 'n' which is the value of D5 to D7 without a signal. The line returns the value of 1 to all bits in the first byte. If there was a signal coming through the EAR socket this would return the value of 'n' + 64.

The only thing that remains is to read the value of the signal, 'n' is no tone, and n + 64 is a tone. Unfortunately Basic can only handle about 50 or 60 instructions a second, but the human voice can be two or three thousand cycles per second. The only possible way of interpreting this number of cycles is in a machine code routine. As far as I know there is not yet one generally available.

GIVING THEM A PLUG

T C Choy, Peel Road, South Woodford, London, writes:

Q I have a 16K Spectrum and would like to expand it to the full 48K. My Spectrum has the new pcb with 12 IC sockets, two of which are 14 pin and the rest 16 pin. According to your issue number 25, East London Robotics can supply these at £25, but I have been unable to contact the firm. Can you tell me which chips I need? If they are the normal 2114s, then I can easily obtain them from an electronics retailer. I would rather not send my Spectrum back to Sinclair, wait three months and pay more money.

A East London Robotics is in the process of moving, so there are some understandable temporary upsets. I also believe there has been some trouble in getting the correct Ram chips for the Spectrum. Sinclair is using chips that are accessed at 150 nanoseconds.

There is an alternative to East London Robotics — Fountain is doing a complete set of chips for £24.50. This includes the same 4523s that Sinclair uses and the two necessary decoding chips (the two 14 pin sockets). The price is inclusive of postage and packing and VAT. Fountain will also include free details of how to adjust the colour on the Spectrum if you buy the chips. The address is: Fountain Computers Ltd, Darville Road, Alresford, Hants SO24 0BW.

Is there anything about your computer you don't understand, and which everyone else seems to take for granted? Whatever your problem *Peek* it to Ian Beardsmore and every week he will *Poke* back as many answers as he can. The address is *Peek & Poke, PCW*, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.

Ziggurat

Right *is* wrong

If there is to be *artificial* intelligence, we surely need to know what "intelligence" is in the case of humans.

There are many theories about the nature of intelligence, and the ways in which it might be measured, but much all the work carried out in this direction seems to be rather inconclusive.

Pascal (the philosopher, not the programming language) made the astute observation in *his Pensées*: "The greater intellect one has, the more originality one finds in men. Ordinary persons find no difference between men." The truly intelligent person is the person who sees implications and differences in what others consider to be one problem. (As I have noted before: divergent thinking, rather than convergent thinking.)

Traditional intelligence tests are predicated on the convergent mode of thinking: there is only one correct answer to a question. This is the style of thought encouraged by the use of only one language, and one method of programming. There is — again — the notion that there is only one correct way to write a program. As an example of the inadequacies of traditional approaches to intelligence, consider this question from a personality test (the Cattell 16PF Form C): "Which is the odd one out?: *run, see* or *touch*".

Think carefully about your answer. Before I give the correct answer, consider how you would answer this question, "What is the next in the series 1, 3, 5, 7, . . . ?" In both cases you are being asked to find a *rule*, and it is possible to see that a computer might do quite well at intelligence tests (assuming that it had a large enough base of information on which to call). Perhaps computers might be intelligent in this sense, or *potentially* so — but is this really what we mean (intuitively) by "intelligence"?

The answer to the odd-one-out question provided by the producer of the attitude test was *run*. This is obviously wrong. The correct answer is that *all* the words can be considered, legitimately, to be different from the other two (eg *touch* does not have three letters). A better answer (and the answer which would be truly indicative of intelligence), would be "All of them for the following reasons". Intelligence tests should be designed to give most marks to those who could find most answers to a question, marking in terms of the quality of the reasons: impossible to do, but at least trying to appear relevant.

To the question of the series of numbers — there are two immediately obvious answers, 9 (the next odd number) or 11 (the next prime number) or, not so obvious, 2 (it has been missed out). We should measure intelligence by the ability to *construct* rules, rather than the ability to guess the rule that the constructor of the test wanted. It is the human ability to find rules that makes us different.

These two lines are fairly clear in operation:

```
1000 IF X=Y THEN GOTO 2000
1010 PRINT "Different"
```

As we are able to put successive lines together by use of colons in many Basics, then this should be permissible:

```
1000 IF X=Y THEN GOTO 2000 : PRINT "Different"
```

In many Basic versions it is not as you would expect, however. Try it and see. It is not an illegal line, rather, the meaning is not self-evident, and rather *ad hoc* extra rules have to be supplied. Rules are important.

I will continue this next week, but I leave you with this line of Pascal (the language this time), to work out what it *should* mean:

```
IF X=Y THEN IF A=B THEN C:=0 ELSE D:=0 ;
```

If you know the answer, why is it so? ■

Boris Allan

Puzzle

Two-step division

Puzzle No 45

3 0 4 8 5 1 6
7 2 9

Ten discs, each bearing a digit from 0 to 9. As you see, they are divided into two groups such that 3048516 is a perfect square (1746^2) and 729 is a perfect cube (9^3).

Can you divide the discs to form two numbers that are the square and cube of the *same* number?

(Inverting the 6 or 9 is not allowed!)

Solution to Puzzle No 40

We know that *A* must be larger than 35, since $(A - 4)^2$ has four digits (clue 3 down), and *A* is less than 90 (clue 4 across). Similarly, *B* is greater than 9 (clue 1 across) and must be less than 50 (clue 4 across).

```
10 FOR A = 36 to 89. 20 FOR B = 10 to 64. 30 LET
A$ = STR$ A. 40 LET B$ = STR$ B. 50 LET C = A +
B. 60 LET C$ = STR$ C. 70 LET D = A * A + B * B.
80 IF D > 9999 THEN GOTO 220. 90 LET D$ = STR$
D. 100 IF D$(1)<>B$(1) OR D$(2)<>C$(1) THEN
GOTO 210. 110 LET E$ = STR$ (A + 7). 120 IF E$
(1)<>D$(3) THEN GOTO 210. 130 LET F$ = STR$
(A * A). 140 IF F$(3)<>D$(4) THEN GOTO 210. 150
LET G$ = STR$ ((A - 8) * (A - 4)). 160 IF
G$(1)<>B$(2) OR G$(2)<>C$(2) OR G$(3)<>E$(2)
OR G$(4)<>F$(4) THEN GOTO 210. 170 LET H$ =
STR$ (A * A - A * 10). 180 IF H$(4)<>F$(1) THEN
GOTO 210. 190 PRINT A, B. 200 STOP. 210 NEXT B.
220 NEXT A.
```

This gives the result A=47 and B=21.

Winner of Puzzle No 40

The winner is: M A Regan, Burnby Close, Harrogate, North Yorkshire, who receives £10.

Top 10

Spectrum

1	(1)	Penetrator	(Melbourne House)*
2	(2)	The Hobbit	(Melbourne House)*
3	(4)	Horace Goes Skiing	(Psion/Melbourne House)
4	(3)	Time Gate	(Quicksilva)
5	(6)	3D Tanx	(DK'Tronics)
6	(—)	Centipede	(DK'Tronics)
7	(8)	Flight Simulation	(Psion)
8	(9)	Football Manager	(Addictive Games)*
9	(7)	Spectrum Micro Chess	(Artic)*
10	(5)	Arcadia	(Imagine)

*Requires 48K.
(Figures compiled by Buffer Micro Shop, London 01-769 2887)

ZX81*

1	(1)	Flight Simulation	(Psion)
2	(3)	Frogger	(DJL Software)
3	(5)	Kong/Dracula	(Tony Berber)
4	(7)	Football Manager	(Addictive Games)
5	(6)	Mazogs	(Bug-Byte)
6	(4)	Gulp II	(Campbell Systems)
7	(9)	The Fast One	(Campbell Systems)
8	(8)	Sea War	(Panda)
9	(10)	Pimania	(Automata)
10	(2)	3D Defender	(JK Greye)

*All 16K.
(Figures compiled by Buffer Micro Shop, London 01-769 2887)

Vic20

1	(4)	Abductor	(Uamasoft)
2	(1)	Frog	(Interceptor Micros)
3	(3)	Andes Attack	(Uamasoft)†
4	(5)	Traxx	(Uamasoft)†
5	(7)	Gorf	(Commodore)*
6	(2)	Alien Attack	(Interceptor Micros)
7	(—)	Arcadia	(Imagine)
8	(10)	Grid Runner	(Uamasoft)
9	(8)	Skramble	(Rabbit)
10	(—)	Krazy Kong	(Interceptor Micros)

*Cartridge. †Required 8K or 16K.
(Figures compiled by Vic Centre, London 01-992 9904)

Atari

1	(10)	Sea Dragon	(Adventure International)
2	(2)	Miner 2049er	(Big Five)*
3	(3)	Preppie	(Adventure International)
4	(—)	Scot Adams Graphical Adventure 1	(Adventure International)§
5	(4)	Snooker and Billiards	(Thorn EMI)*
6	(6)	Star Raiders	(Atari)*
7	(—)	Floyd of the Jungle	(Microprose)‡
8	(—)	Galaxians	(Atari)*
9	(7)	Stratos	(Adventure International)
10	(—)	Astro Chase	(First Star)†

*Cartridge. †32K cassette. ‡32K disc. §48K disc.
(Figures compiled by Calisto Computers, Birmingham 021-632 6458)

Books

1	(4)	Assembly Language Programming for the BBC Micro, *Birnbaum*	(Macmillan)
2	(—)	The Working Dragon 32, *Lawrence*	(Sunshine)
3	(3)	Computer's First Book of Vic, *various authors*	(Computer)
4	(1)	Spectrum Machine Language for the Absolute Beginner, *Tang*	(Melbourne House)
5	(2)	Creative Graphics on the BBC Micro, *Cownie*	(Acornsoft)
6	(7)	Understanding Your Spectrum, *Logan*	(Melbourne House)
7	(—)	Computer's Second Book of Atari, *various authors*	(Computer)
8	(—)	Load and Go With Your Dragon, *Phipps*	(Phipps)
9	(9)	Mastering the Vic20 *Jones*	(Horwood)
10	(8)	Z80 Assembly Language Programming, *Leventhal*	(Osborne)

(Figures compiled by Watford Technical Books, Watford 0923 23324)
(Last week's position in brackets)

100 FREE PROGRAMS

FROM SILICA SHOP — WITH EVERY PURCHASE OF AN

ATARI 400 800

ATARI

ATARI PRICES REDUCED!

We at Silica Shop are pleased to announce some fantastic reductions in the prices of the Atari 400/800 personal computers. We believe that the Atari at its new price will become the U.K.'s most popular personal computer and have therefore set up the Silica Atari Users Club. This club already has a library of over 500 programs and with your purchase of a 400 or 800 computer we will give you the first 100 free of charge. There are also over 350 professionally written games and utility programs, some are listed below. Complete the reply coupon and we'll send you full details. Alternatively give us a ring on 01-301 1111 or 01-309 1111.

ATARI 400 with 16K	**£199**
ATARI 400 with 32K	**£248**
ATARI 800 with 16K	**£449**

400/800 SOFTWARE & PERIPHERALS

Don't buy a T.V. game! Buy an Atari 400 personal computer and a game cartridge and that's all you'll need. Later on you can buy the Basic Programming cartridge (£35) and try your hand at programming using the easy to learn BASIC language. Or if you are interested in business applications, you can buy the Atari 800 + Disk Drive + Printer together with a selection of business packages.

Silica Shop have put together a full catalogue and price list giving details of all the peripherals as well as the extensive range of software that is now available for the Atari 400/800. The Atari is now one of the best supported personal computers. Send NOW for Silica Shop's catalogue and price list as well as details on our users club.

THE FOLLOWING IS JUST A SMALL SELECTION FROM THE RANGE OF ITEMS AVAILABLE:

ACCESSORIES
Cables
Cassettes
Diskettes
Joysticks
Le Stick - Joystick
Misc Supplies
Paddles

ADVENTURE INT
Scott Adams Adv
No 1 Adventureland
No 2 Pirate Adv
No 3 Mission Imp
No 4 Voodoo Cast
No 5 The Count
No 6 Strange Ody
No 7 Mystery Fun
No 8 Pyramid Of D
No 9 Ghost Town
No 10 Sav Island 1
No 11 Sav Island 2
No 12 Golden Voy
Angle Worms
Deflections
Galactic Empire
Galactic Trader
Lunar Lander
Mountain Shoot
Rearguard
Star Fire
Sunday Golf

AUTOMATED SIMULATIONS
Crush Crumble Crisp
Dawsonoid of Rvn
Dragons Eye
Invasion Orion
Rescue at Rigel
Ricochet
Star Warrior
Temple of Apshai
Upper Reaches Apsh

BOOKS
Basic Ref Manual
Compute Atari DOS
Compute Bk Atari
Compute Magazine
Op Rs Atari
DOS Utilities Lst
OOS2 Manual
Mac Atari Books
Op System Listing
Wiley Manual

BUSINESS
Calculator
Database Managers
Decision Maker
Graph It
Invoicing
Librarian
Mail & Lists Anal
Nominal Ledger
Payroll
Personal Fin Mgmt
Purchase Ledger
Sales Ledger
Statistics 1
Stock Control
Teletext 1
Visicalc
Weekly Planner
Word Processor

CRYSTALWARE
Beneath The Pyram
Fantasyland 2041
Galactic Quest
House Of Usher
Sands Of Mars
Waterloo
World War III

DYNACOMP
Alpha Fighter
Chompalo
Crystals
Forest Fire
Intruder Alert
Monarch
Moonbeable
Moving Maze
Nominoes Jigsaw
Rings of The Emp
Space Tilt
Space Trap
Stud Poker
Triple Blockade

EDUCATION from APX
Algebra
Atlas of Canada
Cubbyholes
Elementary Biology
Frogmaster
Hickory Dickory
Inst Company Dem
Lemonade
Letterman
Magmania

Maths Tac Toe
Means & Prob Solvg
Mugwump
Music Terms/Notatn
Musical Computer
My First Alphabet
Number Blast
Peripatic
Presidents Of U.S.
Quiz Master
Starware
Stereo 3D Graphics
Three R Math Sys
Video Math Flash
Wordmaster

EDUCATION from ATARI
Conv French
Conv German
Conv Italian
Conv Spanish
Energy Czar
Eurocomm C & Cass
Hangman
Invrt To Prog 1/2/3
Kingdom
Music Composer

Scram
States & Capitals
Touch Typing

EMI SOFTWARE
British Heritage
Cribbage/Dominoes
Darts
European Scene Jig
Hickory Dickory
Humpty Dumpty
Jumbo Jet Lander
Shooter & Billiards
Submarine Commndr
Super Cubes & Tiles
Tournament Pool

ENTERTAINMENT from APEX
Alien Egg
Anthill
Assault
Avalanche
Bobat
Blackjack Casino
Block Buster
Block 'Em
Bumper Pool

Carrie
Centurion
Checker King
Chinese Puzzle
Codebreaker
Comedy Diskette
Dice Poker
Dog Daze
Domination
Downhill
Eastern Front
Gateway to Apshai
Graphics/Sound
Jaw-O
Jukebox
Lunarpheed
Memory Match
Midas Touch
Monitor
Outlaw/Howitzer
Preschool Games
Pro Bowling
Pushover
Rabbotz
Reversi II
Salmon Run
747 Landing Simul
Seven Card Stud

ENTERTAINMENT from ATARI
Asteroids
Basketball
Blackjack
Centipede
Chess
Entertainment Kit
Missile Command
Pac Man
Space Invaders
Star Raiders
Super Breakout
Video Easel

ONLINE SYSTEMS
Crossfire
Frogger

Bloxx Adventure
Solitaire
Space Chase
Space Trek
Surface Patrol
Text Trek
Terry
Wizards Gold
Wizards Revenge

PERIPHERALS
Centronics Printers
Disk Drive
Epson Printers
Program Recorder
RS232 Interface
Thermal Printer
16K Memory RAM
32K Memory RAM

PERSONAL INT from APX
Addy Mac System
Banner Generator
Blackjack Tutor
Going To The Dogs
Keyboard Organ
Morse Code Tutor
Personal Fitness Prg
Player Piano
Sketchpad

Jawbreaker
Mission Asteroid
Moonstrike
Threshold
Uptown/Uptown Pl
Wizard & Princess

PERSONAL INT from ATARI
Basic Tutor
Conv Pascal
Disk Utility
Home Filing Mgr
Microsoft Basic
Pilot (Author)
Pilot (Consumer)
Pilot (Educator)
Programming Kit

PROGRAMMING AIDS for Atari
Assembler Editor
Disembler (APX)
Microsoft Basic
Pascal (APX)
Pilot (Consumer)
Pilot (Educator)
Programming Kit

SANTA CRUZ
Basics of Animation
Bobs Business
Display Lists
Graphics Machine
Kids 1 & 2
Horizontal Scrolling
Master Memory Map
Mini Word Processor
Page Flipping
Player Missile Gr
Player Piano
Sounds
Vertical Scrolling

SILICA CLUB
Over 500 programs
write for details

FOR FREE BROCHURES – TEL: 01-301 1111

FREE LITERATURE

I am interested in purchasing an Atari 400/800 computer and would like to receive copies of your brochures and test reports as well as your price list covering all of the available Hardware and Software.

Name .....

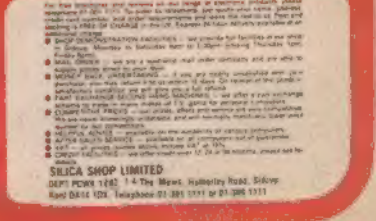
Address .....

.....

Postcode .....

PCWK 12 82

SILICA SHOP



SILICA SHOP LIMITED
DEPT PCWK 1/82 1-4 The Mews, Hatherley Road, Sidcup
Kent DA14 4DX. Telephone 01-301 1111 or 01-309 1111